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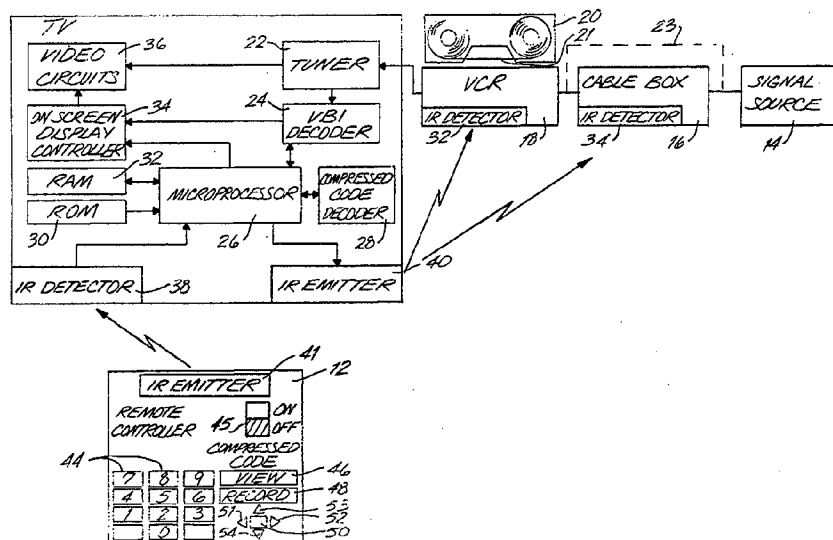
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(54) Title: AN APPARATUS FOR ACCESSING RECORDED PROGRAMS

**(57) Abstract**

A television (40) for controlling a video cassette recorder (18) to access programs on a video cassette tape (20), the television (40) comprising means (24) for retrieving a directory of programs from a television signal received from the video cassette recorder, means (24) for retrieving a program identifier from the television signal received from the video cassette recorder, means (34) for displaying the directory of programs to allow a user to select a program from the directory, means (26) for determining from the retrieved program identifier and the selected program the amount to either advance or rewind the video cassette tape (20) to position the video cassette tape (20) in the video cassette recorder (18) at the beginning of the selected program, and means (26) for commanding the video cassette recorder (18) to position the video cassette tape (20) at the beginning of the selected program.

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10 **AN APPARATUS FOR ACCESSING RECORDED PROGRAMS****Background of the Invention**

15 This invention relates generally to televisions and particularly to apparatus and methods for controlling video cassette recorders from a television and also relates to electronic guides and electronic magazines.

20 Previews of upcoming movies or television programs are commonly shown to generate interest in them. One technique is to show clips of the video before or after the full presentation of another program. This is done both for television programs or movies to be shown on television. Increasingly common is the inclusion of video clips of other movies on a rented video cassette tape. The renter of the video cassette tape rents the tape to watch a particular movie, but also can watch the previews, which are put onto the otherwise unused tape in the video cassette. A problem with this conventional technique is that the
25 viewer must watch the entire tape to ascertain which previews are present.

30 Also increasingly common is the video cassette tape with infomercials. Usually, only one infomercial is put on a tape, for example a Plymouth Voyager advertisement, and the tape is mailed out to potential buyers. If more infomercials or advertisements are on the tape then the user must watch the entire tape to see all the advertisements. Even if a table of contents is provided at the beginning of the tape, there is no easy method of advancing the tape to the location of the selected advertisement.

 It is desirable to have a common point of control for accessing programs on a video tape cassette and a television is able to provide this capability.

35 Accordingly, there is a need in the art for a television for controlling a video cassette recorder to access programs on a video cassette tape. There is

1 also a need for a television for providing control for indexing a tape to a selected program or video.

Summary of the Invention

5 In an embodiment of the present invention a television for controlling a video cassette recorder to access programs on a video cassette tape, includes means for retrieving a directory of programs from a television signal received from the video cassette recorder, means for retrieving a program identifier from the television signal received from the video cassette recorder, means for
10 displaying the directory of programs to allow a user to select a program from the directory, means for determining from the retrieved program identifier and the selected program the amount to either advance or rewind the video cassette tape to position the video cassette tape in the video cassette recorder at the beginning of the selected program, and means for commanding the video cassette recorder to position the video cassette tape at the beginning of the selected program.
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In a specific embodiment television further comprises a means for storing the retrieved directory of programs.

In another specific embodiment the means for retrieving a directory of programs from a television signal comprises a vertical blanking interval decoder.

20 In yet another specific embodiment the means for retrieving a program identifier from the television signal comprises a vertical blanking interval decoder.

In another specific embodiment the means for commanding the video cassette recorder to position the video cassette tape at the beginning of the selected program comprises means for determining from the retrieved program
25 identifier and the selected program a first number of index marks to either advance or rewind the video cassette tape to the beginning of the selected program, and means for commanding the video cassette recorder to advance or rewind the first number of index marks.

30 In another specific embodiment the program identifier comprises a program number.

In yet another specific embodiment the means for displaying the directory of programs further comprises an on screen display controller.

In another specific embodiment the television further comprises means for selecting a program.

35 In another specific embodiment the means for selecting a program comprises a means for using a cursor to select a program from the displayed directory.

1 In another specific embodiment the television further comprises means for commanding the video cassette recorder to play the selected program.

5 In yet another specific embodiment the television further comprises means for commanding the video cassette recorder to record at a later time a second program associated with the selected program.

10 In another specific embodiment the means for commanding the video cassette recorder to record at a later time a second program associated with the selected program comprises a means for decoding and expanding a compressed code, representative of, and compressed in length from, the combination of a channel, a date, a time-of-day, and a length for a program coupled to said means for commanding.

 In another specific embodiment the television functions with a remote controller.

15 In another specific embodiment the television further comprises means for retrieving from the television signal an end of program indication, and means for commanding the video cassette recorder to stop playing the video cassette tape upon retrieval of the end of program indication.

20 In yet another specific embodiment the means for retrieving from the television signal an end of program indication comprises a vertical blanking line decoder.

 In another specific embodiment the television further comprises a means for transmitting a command to the video cassette recorder.

25 In another specific embodiment the means for transmitting a command to the video cassette recorder comprises an infrared emitter.

30 In yet another specific embodiment the television further comprises means for retrieving an index indication from a received television broadcast signal being recorded by the video cassette recorder on the video cassette tape, and means for sending an index mark command to the video cassette recorder in response to retrieving the index indication from the received television broadcast signal to cause an index mark to be written by the video cassette recorder on the video cassette tape.

 In another specific embodiment the means for retrieving an index indication from a received television broadcast signal comprises a vertical blanking interval decoder.

35 In another embodiment of the present invention a television for controlling a video cassette recorder to access programs on a video cassette tape, includes means for retrieving a guide of programs from a television signal received from

1 the video cassette recorder, means for retrieving guide data associated with the
guide of programs from the television signal received from the video cassette
recorder, means for retrieving a still frame indication from the television signal
received from the video cassette recorder, means for sending a still frame
5 command to the video cassette recorder in response to retrieving a still frame
indication, means for displaying the guide of programs to allow a user to select
a program from the guide, means for determining from the retrieved guide data
the amount to either advance or rewind the video cassette tape to position the
video cassette tape in the video cassette recorder at the beginning of the
10 selected program, and means for commanding the video cassette recorder to
position the video cassette tape at the beginning of the selected program.

In another embodiment of the present invention an apparatus for
controlling a video cassette recorder to access programs on a video cassette tape
includes means for retrieving a guide of programs from a television signal
15 received from the video cassette recorder, means for retrieving guide data
associated with the guide of programs from the television signal received from
the video cassette recorder, means for retrieving a still frame indication from the
television signal received from the video cassette recorder, means for sending a
still frame command to the video cassette recorder in response to retrieving a still
20 frame indication, means for displaying the guide of programs to allow a user to
select a program from the guide, means for determining from the retrieved guide
data the amount to either advance or rewind the video cassette tape to position
the video cassette tape in the video cassette recorder at the beginning of the
selected program, and means for commanding the video cassette recorder to
25 position the video cassette tape at the beginning of the selected program. In the
following specific embodiments the apparatus of this embodiment can be
substituted for the television.

In another specific embodiment the television further comprises a means
for storing the retrieved guide and retrieved guide data.

30 In another specific embodiment the means for retrieving guide data
comprises a vertical blanking interval decoder.

In a specific embodiment the means for retrieving a still frame indicator
from the television signal comprises a vertical blanking interval decoder.

35 In another specific embodiment the means for commanding the video
cassette recorder to position the video cassette tape at the beginning of a
program selected from the guide comprises means for determining from the
retrieved guide data a first number of index marks to either advance or rewind

1 the video cassette tape to the beginning of the selected program, and means for commanding the video cassette recorder to advance or rewind the first number of index marks.

5 In another specific embodiment the means for displaying the guide further comprises an on screen display controller.

In yet another specific embodiment the television further comprises means for selecting a program.

10 In another specific embodiment the means for selecting a program comprises a means for using a cursor to select a program from the displayed guide.

In another specific embodiment the television further comprises means for commanding the video cassette recorder to play the selected program.

15 In yet another specific embodiment the television further comprises means for commanding the video cassette recorder to record at a later time a second program associated with the selected program.

20 In another specific embodiment the television the means for commanding the video cassette recorder to record at a later time a second program associated with the selected program comprises a means for decoding and expanding a compressed code, representative of, and compressed in length from, the combination of a channel, a date, a time-of-day, and a length for a program coupled to said means for commanding.

In another specific embodiment the television further comprises a remote controller.

25 In yet another specific embodiment the television further comprises a means for transmitting a command to the video cassette recorder.

In another specific embodiment the means for transmitting a command to the video cassette recorder comprises an infrared emitter.

30 In another specific embodiment the television further comprises means for retrieving an index indication from a received television broadcast signal being recorded by the video cassette recorder on the video cassette tape, and means for sending an index mark command to the video cassette recorder in response to retrieving the index indication from the received television broadcast signal to cause an index mark to be written by the video cassette recorder on the video cassette tape.

35 In yet another specific embodiment the means for retrieving an index indication from a received television broadcast signal comprises a vertical blanking interval decoder.

1 In another embodiment of the present invention A method for controlling
a video cassette recorder from a television to access programs on a video
cassette tape, the steps of providing a video cassette tape having a first length
of video cassette tape having a first index mark written near the beginning of
5 the first length and a second index mark written near the end of the first length,
a guide to programs on the video cassette tape written between the first and
second index mark, and guide data written between the first and second index
mark, the guide data associated with the guide including for each program
contained on the video cassette tape a number of index marks either forward or
10 backward on the tape from the guide data to the program, and providing a
plurality of programs on the video cassette tape, each program having a third
index mark written near the beginning of the program and a fourth index mark
written near the end of the program.

15 In a specific embodiment the method further comprising the steps of
playing the video cassette tape on the video cassette recorder and sending the
video cassette recorder output signal to the television, retrieving the guide data
from the output signal with a video blanking interval decoder in the television,
detecting a still frame command in the output signal with a video blanking
interval decoder in the television, sending a still frame command from the
20 television to the video cassette recorder to freeze the guide on the output signal,
and displaying the guide on the television for the user to select a program from
the guide.

25 In another specific embodiment the method further comprises the steps
of commanding the video cassette recorder from the television to advance or
rewind the video cassette tape to the selected program by advancing or
rewinding a number of index marks according to the guide data associated with
the selected program, and sending a command to the video cassette recorder to
play the selected program.

30 In another specific embodiment the method further comprises the steps
of commanding the video cassette recorder to record at a later time a second
program identified in the guide data associated with the selected program.

35 In yet another specific embodiment the method further comprises the
steps of decoding and expanding a compressed code, representative of, and
compressed in length from, the combination of a channel, a date, a time-of-day,
and a length for the second program.

 In another specific embodiment the method further comprises the step of
delivering the video cassette tape to the homes of users.

1 In yet another specific embodiment the step of delivering the video cassette tape to the homes of users further comprises the step of delivering the video cassette tape along with a newspaper to the homes of users.

5 Another embodiment of the present invention is a method for controlling a video cassette recorder from a television to access programs on a video cassette tape, including the steps of broadcasting a television signal for a first length of time, the television signal having an initialization message to obtain a key number, broadcasting a key number in the vertical blanking interval of the television signal, and broadcasting a still frame command in the vertical blanking interval of the television signal, broadcasting a television signal for a second length of time, the television signal having a first index mark in the vertical blanking interval near the beginning of the second length and a second index mark in the vertical blanking interval near the end of the second length, a guide to programs broadcast between the first and second index mark, guide data associated with the guide broadcast between the first and second index mark, the guide data including for each program contained in the broadcast a number of index marks either forward or backward in the broadcast from the guide data to the program, and broadcasting a still frame command near the second index mark, and broadcasting a television signal for a third length of time, the television signal having a plurality of programs, each program having a third index mark broadcast in the vertical blanking interval near the beginning of the program and a fourth index mark broadcast in the vertical blanking interval near the end of the program.

25 In a specific embodiment the method further comprises the steps of recording the broadcast on a video cassette tape with a video cassette recorder as the broadcast is received, ignoring any still frame commands in the broadcast, and detecting with a vertical blanking interval decoder in the television any index marks in the broadcast and for each index mark detected in the broadcast sending a index mark command from the television to the video cassette recorder to write an index mark on the video cassette tape as the broadcast is recorded on the video cassette tape.

30 In another specific embodiment the method further comprises the steps of rewinding the video cassette tape after the broadcast is complete, playing the video cassette tape, retrieving the broadcast key number with a vertical blanking interval decoder in the television, detecting a still frame command with a vertical blanking interval decoder in the television, and displaying the initialization message to obtain a key number.

1 In another specific embodiment the method further comprises the step of requiring the user to obtain and enter a key number.

 In yet another specific embodiment the method further comprises the steps of comparing the entered key with the broadcast key number, if the
5 entered key and the key indication compare then erasing a first length of video cassette tape corresponding to the first length of the broadcast, and if the entered key and the key indication do not compare then not erasing a first length of video cassette tape corresponding to the first length of the broadcast.

 In another embodiment of the present invention an apparatus for allowing
10 a television to control a video cassette recorder to access programs on a video cassette tape, including a video cassette tape having a first length of video cassette tape having a first index mark written near the beginning of the first length and a second index mark written near the end of the first length, a guide to programs on the video cassette tape written between the first and second
15 index mark, and guide data written between the first and second index mark, the guide data associated with the guide including for each program contained on the video cassette tape a number of index marks either forward or backward on the tape from the guide data to the program, and a plurality of programs on the video cassette tape, each program having a third index mark written near the beginning
20 of the program and a fourth index mark written near the end of the program.

 In a specific embodiment the guide comprises an index of programs contained on the video cassette tape.

 In another embodiment of the present invention A method for a television to control a video cassette recorder to access programs on a video cassette tape,
25 including the step of providing a plurality of programs on a video cassette tape, each program having a first index mark written near the beginning of the program and a second index mark written near the end of the program, a directory of programs written in a vertical blanking interval between the first and second index marks, and a program identifier written in a vertical blanking interval
30 between the first and second index marks.

 In a specific embodiment the method further comprises the steps of playing the video cassette tape on the video cassette recorder and sending the video cassette recorder output signal to the television, retrieving the directory of programs from the vertical blanking interval of the output signal received from
35 the video cassette recorder, retrieving a program identifier from the vertical blanking interval of the output signal received from the video cassette recorder, displaying the directory of programs to allow a user to select a program from the

1 directory, determining from the retrieved program identifier and the selected
program the amount to either advance or rewind the video cassette tape to
position the video cassette tape in the video cassette recorder at the beginning
of the selected program, and commanding the video cassette recorder to position
5 the video cassette tape at the beginning of the selected program.

 In another specific embodiment the method further comprises the step of
storing the retrieved directory of programs.

 In yet another specific embodiment the step of commanding the video
cassette recorder to position the video cassette tape at the beginning of the
10 selected program comprises the steps of determining from the retrieved program
identifier and the selected program a first number of index marks to either
advance or rewind the video cassette tape to the beginning of the selected
program, and commanding the video cassette recorder to advance or rewind the
first number of index marks.

15 In another specific embodiment the method further comprises the step of
selecting a program from the directory.

 In another specific embodiment the step of selecting a program comprises
the step of using a cursor to select a program from the displayed directory.

 In yet another specific embodiment the method further comprises the step
20 of commanding the video cassette recorder to play the selected program.

 In another specific embodiment the method further comprises the step of
commanding the video cassette recorder to record at a later time a second
program associated with the selected program.

 In yet another specific embodiment the step of commanding the video
25 cassette recorder to record at a later time a second program associated with the
selected program comprises the step of decoding and expanding a compressed
code, representative of, and compressed in length from, the combination of a
channel, a date, a time-of-day, and a length for a program coupled to said means
for commanding.

30 In another specific embodiment the method further comprises the step of
retrieving from the output signal with a vertical blanking interval decoder in the
television an end of program indication, and commanding the video cassette
recorder to stop playing of the video cassette tape upon retrieval of the end of
program indication.

35 In another specific embodiment the method further comprises the steps
of retrieving an index indication with a vertical blanking interval decoder in the
television from a received television broadcast signal being recorded by the video

1 cassette recorder on the video cassette tape, and sending an index mark
command to the video cassette recorder in response to retrieving the index
indication from the received television broadcast signal to cause an index mark
to be written by the video cassette recorder on the video cassette tape.

5 In another specific embodiment the method further comprises the step of
delivering the video cassette tape to the homes of users.

 In yet another specific embodiment the step of delivering the video
cassette tape to the homes of users further comprises the step of delivering the
video cassette tape along with a newspaper to the homes of users.

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1 **Brief Description of the Drawings**

The features of specific embodiments of the best mode contemplated of carrying out the invention are illustrated in the drawings, in which:

5 FIG. 1 is a schematic showing a television for controlling a video cassette recorder (VCR) to provide access to programs and video clips according to the present invention.

FIG. 2 is a schematic showing a controller between a television and a VCR for controlling a video cassette recorder (VCR) to provide access to programs and video clips according to the present invention.

10 FIGS. 3A and 3B are schematics showing the partial contents of a random-access memory (RAM) and read-only memory (ROM) according to the present invention.

FIG. 3C is a flow graph of steps for loading infrared codes for the VCR into RAM according to the present invention.

15 FIG. 4A is a schematic of a compressed code decoder coupled to a microprocessor according to the present invention.

FIG. 4B is a flow graph of the steps for decoding a compressed code, which is encoded channel, date, time-of-day, and length (CDTL) information, into CDTL according to the present invention.

20 FIG. 5 is a drawing showing a tape layout for providing access to programs and video clips according to the present invention.

FIG. 6A is a drawing showing the format of a directory according to the present invention.

25 FIG. 6B is a drawing showing the format of a library of multiple directories according to the present invention.

FIG. 6C is a drawing of the format of a portion of the directory for one program or video clip on a vertical blanking interval (VBI) line 20 according to the present invention.

30 FIG. 7 is a drawing of the format of a TPA packet containing tape identification, program number, and absolute address information on VBI line according to the present invention.

FIG. 8 is a flow graph of the steps for accessing programs and video clips on a magnetic tape according to the present invention.

35 FIG. 9 is a drawing showing a display on a television of a text directory according to the present invention.

FIG. 10 is a drawing showing VBI lines according to the present invention.

1 FIG. 11A is a drawing showing another tape layout for providing access
to programs and video clips according to the present invention.

5 FIG. 11B is a drawing showing a tape layout having a hierarchy of guides
and embedded guide data for providing access to video clips or infomercials
according to the present invention.

 FIG. 12 is a flow graph of the steps for accessing video clips on a
magnetic tape having a hierarchy of guides and embedded guide data according
to the present invention.

10 FIG. 13A is a drawing showing a broadcast format for a broadcast of
programs and video clips according to the present invention.

 FIG. 13B is a drawing showing the tape format after recording of the
broadcast on a VCR according to the present invention.

 FIG. 14 is a flow graph of the steps for creating a tape during recording
of a broadcast of programs and video clips according to the present invention.

15 FIG. 15A is a drawing showing a broadcast format for a broadcast of
programs, video clips, and/or a video directory according to the present
invention.

20 FIG. 15B is a drawing showing the tape format after recording of the
broadcast of programs, video clips, and/or a video directory on a VCR according
to the present invention.

 FIG. 16 is a flow graph of the steps for creating a tape during recording
of a broadcast of programs, video clips, and/or a video directory according to the
present invention.

25 FIG. 17 is a drawing showing a display on a television of a video directory
according to the present invention.

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1 **Detailed Description of the Specific Embodiments**

Referring to the drawings, FIG. 1 shows a television 10 for controlling a video cassette recorder 18 to access programs on a video tape cassette 20, which contains tape 21. The video cassette recorder 18 can be used to play
5 video tape cassettes 20, and can also be used to record programs from signal source 14 sent directly via line 23 to VCR 18 or through cable box 16. As shown in FIG. 1, the VCR 18 has an output to tuner 22, which is coupled to video circuits 36. Also receiving the output of tuner 22 is a vertical blanking interval line decoder 24. Vertical blanking interval lines are described below in
10 connection with the discussion of FIG. 10, and information can be contained in the vertical blanking interval lines and decoded. A microprocessor 26 receives decoded VBI information from VBI decoder 24 and processes this information to control VCR 18 to access programs from the video tape cassette 20. Random-access memory 32 and read-only memory are coupled to the microprocessor.
15 An on-screen display controller 34 has an interface to the microprocessor 26 and also an interface to the VBI decoder 24. An infrared detector 38 has an interface to the microprocessor 26 and receives commands from remote controller 12. An infrared emitter 40 in the television 10 interfaces to microprocessor 26 and can send commands to the VCR 18 via infrared detector 32 and to the cable box 16
20 via the infrared detector 34. A compressed code decoder 28 in the television 10 has an interface to microprocessor 26.

In general the television 10 for controlling the video cassette recorder to access programs on the video cassette tape 20 operates by decoding information in the vertical blanking interval line. In VBI decoder 24, processing that
25 information in microprocessor 26, and commanding the VCR 18 via infrared emitter 40 and infrared detector 32 in order to access selected programs for viewing. The television 10 is also able to interact with the video cassette recorder while it is recording a program from signal source 14. The television 10 can also control the recording of programs to be broadcast at a later time on the
30 VCR 18.

The remote controller 12, shown in FIG. 1 has a number of keys, which include numerical keys 44 and compressed code switch 45. The remote controller 12 also includes a view key 46 and a record key 48. The remote controller may further advantageously include a cursor control having up/down
35 keys 53 and 54, respectively, right/left keys 51 and 52, respectively, and an activate key 50. There are means in the remote controller 12 that interpret each key as it is pressed, and send the proper command signal 16 to the television 10

1 via the infrared emitter 41. Except for the unique keys including view key 46,
record key 48, and compressed code switch 45, the remote controller is
essentially the same as any other remote controller in function. It is to be noted
that the typical keys of remote controllers, such as volume control and channel
5 selection, are not shown on the controller of FIG. 1, but would ordinarily be
present.

In FIG. 2 is shown another embodiment of the invention in which there
is a separate controller 60 for controlling the VCR 18 to access programs on
video tape cassette 20. A conventional television 62 can be used with controller
10 60 which is placed between television 62 and the video cassette recorder 18.
The controller 60 has a tuner 22 coupled to a VBI decoder 24 and a
microprocessor 26 which has interfaces to random-access memory 32 and read-
only memory 30. The tuner 22 interfaces to on-screen display controller 34
which also interfaces to VBI decoder 24 and microprocessor 26. The controller
15 operates similarly to the circuitry described for television 10 in that the infrared
detector 38 receives commands from remote controller 12 and the commands
are processed by microprocessor 26. The controller 60 also can control the
operation of VCR 18 and cable box 16 via infrared emitter 40. The operation of
remote controller 12 in FIG. 2 is essentially the same as the remote controller 12
20 in FIG. 1.

The microprocessor 26, shown in FIGS. 1, 2 and 4A performs the overall
control functions, and has attached a read-only memory 30 and a random-access
memory (RAM) 32. Interfaces to the microprocessor 26 include an input from
infrared detector 38 and outputs to infrared emitter 40 and on screen display
25 controller 34. The microprocessor also interfaces to and from vertical blanking
interval decoder 24, to and from clock 42, and to and from compressed code
decoder 28.

As shown in FIG. 3A, the read-only memory 30 includes a section for a
set of instructions for the program that controls the operation of the
30 microprocessor 26 and a section for infrared codes for controlling the television
10 or the controller 60. As shown in FIG. 3B, the random-access memory 32
includes a section for the infrared codes for controlling the VCR including codes
for the following commands: play, record, rewind, stop, index mark, still frame,
and index to an index mark. Also included are sections for a directory, guide
35 data, and a library, whose functions are described below.

FIG. 3C is a flow graph of steps for initializing the television according to
the present invention. A special initialization tape is loaded into the video

1 cassette recorder 18 in step 64 and the initialization tape is played. The
initialization tape has encoded in its video blanking interval lines the infrared code
libraries for substantially all types of VCRs. When the tape is played, video cues
are displayed on the television 10 to enable the user to locate the codes for the
5 particular type of VCR in use. Then in step 70 the infrared codes for the user's
VCR are downloaded into random-access memory 32 via tuner 22, VBI decoder
24, and microprocessor 26. Once the infrared codes have been loaded into the
random-access memory 32 of the television 10 can control the VCR to provide
access to programs and video clips.

10 When a compressed codes are used, the random-access memory 32, as
shown in FIG. 4A, includes a section of stack memory for storing channel, date,
time-of-day, and length (CDTL) for programs selected to be recorded. The
compressed codes are encoded CDTL information and may be advantageously
used to simplify the preprogramming of VCRs.

15 One implementation of the compressed code decoder 28 is shown in FIG.
4A. A microcontroller 90 with a random-access memory 92 and a read-only
memory 94 has interfaces to microprocessor 26. A compressed code, which
represents encoded CDTL, is sent to microcontroller 90, which decodes the
compressed code and returns CDTL information to microprocessor 26. If the
20 microprocessor 26 determines that a compressed code has been received, then
the compressed code will be sent to the compressed code decoder 28 for
decoding. The compressed code decoder 28 converts the compressed code into
channel, date, time and length (CDTL) information which is stored in RAM 32
and used by the microprocessor 26 to control the recording of programs on a
25 VCR.

The method of decoding of the compressed code into CDTL is set forth
in the flow chart of FIG. 4B. As shown in FIG. 4B, the compressed code
decoding can be a function of the output of clock 42. The compressed code
encoding and decoding are described in continuation-in-part application serial No.
30 07/829,412, filed February 3, 1992, which is incorporated herein by this
reference as though set forth in full.

The clock 42 is also used for timing the operations of the microprocessor
26. When a date and time-of-day is read from clock 42 that matches the date
and time in stack memory in random-access memory 32, then the
35 microprocessor 26 controls the VCR to record the program. Instead, if the VCR
has preprogramming storage, then the CDTL information can be sent directly to
the VCR and a clock in the VCR will be used to control the timing of recording.

1 If the VCR also has the ability to decode the compressed codes, then the compressed codes can be sent directly to the VCR and the VCR will decode the compressed codes into CDTL for the programming the VCR.

5 FIG. 5 illustrates one layout of information on a tape 21 for playback in VCR 18 under control by television 10 or controller 60. The tape layout has video and audio tracks 138 for the programs, Video Index Search System (VISS) marks on a control track 140, TPA packets each containing a tape identification number, program number, and absolute address stored on a vertical blanking interval line 19, and a directory stored in the vertical blanking interval line 20 in accordance with the principles of the invention.

10 FIG. 10 is a diagram illustrating a vertical blanking interval of an interlaced television scanning raster. The first field of the television signal starts at the upper left corner of the screen and writes lines to the bottom of the screen. At the bottom of the screen the beam writing the screen retraces in a series of lines back to the top of the screen. These lines are designated as the vertical blanking interval lines 242 in FIG. 10. During the retrace the writing to the screen is blanked; however, because the signal is still present, additional information can be sent during the vertical blanking interval. There are at least 20 lines in the vertical blanking interval. After the vertical blanking interval, the second field is written on the screen and there is another vertical blanking interval, as shown in FIG. 10.

In FIG. 5, VISS marks 146, 148 and 150 are placed in the control track 140 at the start of the each program on the tape.

25 The TPA packets 152, shown in FIG. 5, contain a tape identification number 188, a program number 190 and an absolute address 192, as shown in FIG. 7, and are stored in vertical blanking interval line 20, designated as element 144 on FIG. 5. The tape identification is a number that identifies the video cassette tape being used. The program number relates to the number of the program that is recorded on the tape adjacent to the TPA packet. For example, the tape identification number, shown in FIG. 9, is number 8, and the program number for the program MURPHY BROWN is program number 3. The absolute address in the TPA packet is an indication of the time from the beginning of the tape to the location on the tape at which the particular TPA packet is written. Since the TPA is written in VBI lines across the tape, the absolute address varies across the tape and is quite accurate.

35 The directory written into VBI line 20, designated as element 144 in FIG. 5, has a format as shown in FIG. 6A. In the directory are entries D(0) to D(N),

1 which are directory entries for each program. Each entry D(1) 161, and D(2)
162 to D(N) 164 is used to store information, as shown in FIG. 6C, concerning
a program stored on the recording tape. For example, the program number 172,
the start address 174, the end address 176, the record speed 178, and the
5 compressed code 180 for recording at a later time a second program associated
with the referred to as program number 172. Instead, a channel, date, time-of-
day, and length 182 or a program identifier 184 can be used recording at a later
time a second program associated with the program. The directory for a
program can also contain the title for a program. The directory may be stored
10 in one VBI line 20 or in multiple VBI lines, as required.

When the video cassette tape 20 is played in video cassette recorder 18,
then the directory can be decoded by VBI decoder 24 and stored in random-
access memory 32. The contents of the directory can be displayed on television
10 to allow the user to select a program on the tape for viewing. By decoding
15 the tape identification number from the TPA packets, a library of tapes and
contents of tape can be accumulated in random-access memory 32. The format
166 for the library can be as shown in FIG. 6B.

The method for television 10 or controller 60 to control the video cassette
recorder 18 to access programs on a video cassette tape 20 is described in the
20 flow chart of FIG. 8. Step 200, a tape 21, having the format shown in FIG. 5
is inserted into VCR 18 and the VCR is put in a play mode. As the tape plays the
VBI decoder 24 decodes the VBI lines and stores the tape identification and the
directory on the tape into random-access memory 32 as shown in step 202. In
step 204 the VBI lines are decoded and the program number of the current
25 program at the read/write heads of VCR 18 is retrieved and stored in random-
access memory 32. Then in step 206 a stop command is sent to VCR 18. In
step 208 the microprocessor 26 via on-screen display controller 34 causes the
stored directory to be displayed on the television monitor. In step 210 the user
can select a program for viewing by either positioning a cursor on the program
30 desired or entering a number on remote controller 12. For example, as shown
in FIG. 9 the cursor can be put on to the program MURPHY BROWN or the user
can enter the number 3 to view the program MURPHY BROWN. In step 212 to
record a later broadcast of the program the user pushes the record button on
remote controller 12. If the record button is pushed as determined in step 214,
35 then in step 216, the compressed code for the channel, date, time-of-day and
length for the selected program are sent to the VCR 18 to preprogram the VCR
18 to record the program when it is broadcast. For example, for MURPHY

1 BROWN the compress code as shown on FIG. 9 is 5941. Also contained in this particular directory is the channel number, date and time-of-day which is channel 2, October 17, and 7:00 p.m. The length of the program is also shown for MURPHY BROWN to be 30 minutes.

5 To view a program or a video clip, the user pushes the view button in step 218. It is likely that a user will view a preview or video clip for a program first, and then decide whether he wants to record the program associated with the video clip at a later time. If in step 220 it is determined that the view button has been pushed, then in step 222, microprocessor 26 will calculate the number
10 of index marks between the current position on the tape and the beginning of the selected program as determined by the difference between the retrieved program number and the selected program number. For example, if the retrieved program number is program 3, as shown in FIG. 5, then to access the beginning of program 1 the VCR 18 must rewind the video tape cassette by 3 VISS marks,
15 so an index command of -3 is sent to the VCR. In step 224 the television 10 or the controller 60 sends the index command to VCR 18 to advance or rewind the tape by the number of VISS marks to the selected program or video clip. Then in step 226 a command is sent to play the selected program or video clip. While the program or video clip is playing the VBI decoder 24 continues to decode the
20 vertical blanking interval lines and if a VISS mark is detected in step 228 then steps 204 and 206 are repeated and a directory again displayed on the television in order for the user to make another selection. At this time the user having viewed a video clip could decide to select the program associated with the video clip for later recording by the VCR 18.

25 FIG. 11A is a drawing showing another tape layout having an electronic guide with video clips according to the present invention. The tape has a control track 262, video and audio tracks 263 and vertical blanking interval 264 lines. As shown in FIG. 11A, the first length of the tape has VISS marks 266 and 267 in the control track 262. Between VISS marks 266 and 267 is a guide 270 in
30 the video and audio tracks 263. As shown in FIG. 11A, the guide 270 consists of an index to video clips on the tape. For example, the first video clip is ALADDIN which will be shown on channel 2 on September 6th at 2:00 p.m. and has a length of two hours. The second video clip is WAR AND PEACE, which has a compressed code of 21596.

35 In the vertical blanking interval 266 lines is guide data associated with the guide. The guide data 272 includes for each video clip in the guide 270, the number of VISS marks from the guide to the video clip. Also, a compressed

1 code associated with the video clip can be included within the guide data 272
or the channel, date, time of date and length (CDTL) or other program identifier
can be included in the guide data for each video clip. The compressed code and
the CDTL are used to preprogram a VCR to record at a later time a program
5 associated with the video clip. After the end of the guide data is a still frame
command 273.

If a cursor is used to select a video clip from the guide then a screen map
275 can be included in the guide data. The screen map 275 contains information
that correlates each entry in the guide to a position on a displayed screen. As
10 the user moves the position of the cursor the microprocessor 26, which
processes the cursor commands from the remote controller 12, uses the screen
map to know which entry in the guide is selected.

In a second length of the tape following the guide and the guide data, the
first video clip 274 is written in the audio/video tracks 263 between VISS marks
15 264 and 268.

Following the video clip, the guide is repeated, as shown by guide 278 in
FIG. 11A and guide data 280 is written on the vertical blanking interval lines.
The guide data 280 is not the same as the guide data 272, because the number
of VISS marks to a video clip from guide data 272 is different from the number
20 of VISS marks to a video clip from guide data 280. As shown in FIG. 11A the
second video clip 282 follows guide 278 and guide data 280. The pattern of
repeating the guide and guide data after each video clip is repeated across the
tape.

As the tape is played on video cassette recorder 18 the guide is displayed
25 on television 10 and the guide data is sent via VBI decoder 24 to random-access
memory 32. At the end of the guide data is a still frame command. When this
still frame command is decoded by the VBI decoder 24, the microprocessor 26
sends a still frame command via infrared emitter 40 and infrared detector 32 to
video cassette recorder 18. The guide is then displayed as a frozen frame on
30 television 10.

The guide can appear as text, similar to the program guide shown in FIG.
9, or can be a video frame as shown in FIG. 17. An advantage of the video
frame is that the guide can have a more interesting appearance, use any font
desired, and present a graphical interface to the user, such as those now
35 common in personal computers. A video display is very useful for displaying
Japanese or Chinese symbols.

1 To access a video clip the user pushes one of the number keys 44 and
then pushes view key 46 on remote controller 12. It is also possible to use the
cursor controls on remote controller 12 to highlight the desired program as
shown by highlighted program 236 in FIG. 9 or highlighted program 522 in FIG.
5 17. The television 10 then sends index commands to video cassette recorder 18
via infrared emitter 40 and infrared detector 32 to advance or rewind the tape
to the video clip selected by the user. This is accomplished by the
microprocessor 26 in television 10 processing the guide data to determine the
number of VISS marks forward or backward on the tape to the video clip
10 selected by the user. For example, if guide 270 is displayed then to access video
clip 282, the index command +3 is sent to advance the VCR to the beginning
of video clip 282. If guide 278 is displayed then to access video clip 274, the
index command -4 is sent to rewind the VCR to the beginning of video clip 274.

FIG. 11B shows another tape layout. In FIG. 11B a main guide 310 is
15 shown that can be used to access another guide, such as guide 314. This permits
a hierarchy of guides to be displayed. For example, in guide 310 if the user
selects category 1 for cars, then guide 314 is displayed listing cars for which
video clips are available, such as BMW, Mercedes, and LEXUS.

The video clips can be used for showing previews of television programs
20 or movies and also for classified advertisements and infomercials, such as for
real estate. The video clip can also be arranged as a video magazine.

The method for the television 10 or the controller 60 to control the video
cassette recorder 18 to access programs on a video tape cassette 20 is
described in the flow graph shown in FIG. 12. In step 330 a video tape cassette
25 20 with tape 21 in the format described in either FIG. 11a or FIG. 11B is inserted
into the VCR 18 and the VCR is put into the play mode. In step 332 the guide
data in VBI 264 lines of FIG. 11A or VBI 294 lines of FIG. 11B are decoded by
VBI decoder 24 and stored into random-access memory 32. If a screen map 275
of FIG. 11A or screen map 315 of FIG. 11B is present to allow accessing a
30 program using a cursor, then the screen map is also decoded from the VBI lines
and stored into random-access memory 32. In step 334 it is determined whether
still frame command 273 has been detected by the VBI decoder 24. If the still
frame command has been detected then in step 336 the television 10 or the
controller 60 sends a still frame command to VCR 18. This results in the guide
35 270 being frozen on the television monitor in step 338. In step 340 the user
selects a video clip or program from the guide 270 by pushing a number key on
remote controller 12 or positioning a cursor on the television monitor by using

1 the remote controller cursor position keys. Then in step 342 the user can select
to record a later broadcast of a program associated with the video clip or a
program in the guide 270 by pushing the record button 48 on the remote
controller 12. If it is determined in step 344 that the record button has been
5 pushed, then in step 346 the compressed code or channel, date, time-of-day and
length of the program to be recorded are retrieved from the guide data that has
been stored in the random-access memory 32 and sent to the vide cassette
recorder 18 to preprogram the VCR to record the program at a later time.

If the user wishes to view one of the video clips that are listed in the
10 guide 270 then the user pushes the view button 46 in step 348. If it is
determined in step 350 that the view button has been pushed, then in step 352
television 10 sends index commands to VCR 18 to advance or rewind the tape
by the number of VISS marks to the selected video clip. For example, if WAR
AND PEACE is selected from guide 270 then the corresponding guide data for
15 clip number 2 would indicate that there are three VISS marks between the
current position of the tape 21 relative to the read/write heads of the VCR 18
and the beginning of clip number two designated as element 282 in FIG. 11A.
After the VCR 18 has advanced or rewind to the beginning of the video clip to
be viewed, then in step 354 a command is sent to the VCR to play the video
20 clip. In steps 332 and 334 are repeated and the user can select another video
clip or program to view or record. Note that on FIG. 11A, after clip number two,
designated as element 282 on FIG. 11A, that the guide 278 is repeated and that
the guide data 284 is again present. There is a difference between guide data
284 and the guide data 272 because the number of VISS marks to a selected
25 video clip is adjusted between the two guide data because of their position on
the tape. In the description so far it has been assumed that the user is
provided with a video cassette tape that is prerecorded in a manner similar to the
tape formats of FIGS. 5, 11A or 11B. One method of providing the user with a
properly prerecorded video tape cassette is to deliver the tape along with another
30 item that is regularly delivered to the user, such as a daily or weekly newspaper.

Another embodiment of the invention is to broadcast the programs and
video clips rather than to provide them directly on a video cassette tape. The
television 10 or controller 60 controls the recording of the broadcast on tape.

FIG. 13A illustrates one layout of information in a broadcast. The
35 broadcast layout has video and audio 358 for each program, TPA packets each
containing a tape identification number and program number stored on a vertical
blanking interval line 19, a directory broadcast in the vertical blanking interval line

1 20, and a V(M) packet broadcast in the vertical blanking interval lines at the beginning of each program.

5 The TPA packets 372, shown in FIG. 13A, contain a broadcast identification number and a program number, which are similar to the tape identification number 188 and program number 190, as shown in FIG. 7, and are broadcast in vertical blanking interval line 19, designated as element 362 on FIG. 13A. The broadcast identification is a number that identifies the broadcast.

10 The directory 374 written into VBI line 20, designated as element 364 in FIG. 13A, has a format as shown in FIG. 6A and the information for each program can include entries such as the program number, the program title, and a compressed code for recording at a later time a second program associated the program number. For example, the video clip may be a preview for a movie that is to be broadcast later. The compressed code is used to program a VCR to record the movie at a later time. The directory may be stored in one VBI line 20 or in multiple VBI lines, as required.

15 V(M) packets 366, 368 and 370 are broadcast in a VBI line, referred to as element 360 on FIG. 13A, at the beginning of each program. The VBI decoder 24 can decode a broadcasted V(M) packet to detect the beginning of each program during the broadcast.

20 If the VBI decoder 24 detects a V(M) packet during a broadcast, then the television 10 or controller 60 commands the VCR to write a VISS mark into the control track of the tape. For the broadcast shown in FIG. 13A the result after detecting V(M) packets and commanding the writing of VISS marks is shown in FIG. 13B which shows VISS marks 380, 384 and 386 written into the control track 380 of the tape. The V(M) packets are still present in the vertical blanking interval line, so it is important that during a play operation that the television 10 ignores the V(M) packets so that the VISS marks are not written again.

25 FIG. 14 is a flow chart of the steps for controlling the recording of a broadcast. In step 390 the VCR is in the process of recording a broadcast. The television 10 or controller 60 knows the mode of the VCR because they command through the infrared detector 32 the VCR to play, record and the like. In step 392 the VBI decoder decodes the VBI lines, and in step 396 if a V(M) packet is detected then, because the television 10 knows the VCR is in a record mode, the television 10 sends an index mark command to the VCR 18 and the VCR writes a VISS mark on the control track.

30

35

1 A user can be charged either a sales fee or a rental fee for a pre-recorded video cassette tape. In the case of a broadcast other provisions have to be made in order to charge the user for the information in the broadcast.

5 FIG. 15A illustrates another layout of the information in a broadcast. The broadcast includes a video and audio portion 402. In the VBI line 400 V (M) packets are broadcast wherever a VISS mark is wanted on the tape. A message 406 is broadcast at the beginning of the broadcast and indicates to the user to call a 900 number to obtain a key number. A key number 408 and a still frame command 410 are broadcast in the vertical blanking interval lines, designated as 404 in FIG. 15A. Then a guide 414 and guide data 416 are broadcast. Guide 414 references other guides, in the same manner as FIG. 11B. For example, note that guide 414 is an index that includes "PRIME TIME" and that the guide data allows access to the guide 424, which is a detailed guide for that span of time. The guide data 416 is followed by a screen map 415 and a still frame command 420, which is recorded but otherwise ignored by television 10 or controller 60 during the broadcast.

15 The guide 424 could appear on the television screen as graphic display 500, shown in FIG. 17, which includes time-of-day 502, date 504, day of week 506, and programs 520. Buttons at the bottom that the user can select, using a cursor, include view television 508, view 510, record 514, and return 518 to the previous menu. To select I LOVE LUCY the user would position a cursor on program 522. The view 510 and record 514 graphical buttons operate in an analogous manner to the same named buttons on the remote controller 12.

20 If during a broadcast the VBI decoder 24 detects a V(M) packet, then the television 10 or controller 60 commands the VCR to write a VISS mark into the control track of the tape. For the broadcast shown in FIG. 15A the result after detecting V(M) packets and commanding the writing of VISS marks is shown in FIG. 15B. VISS marks 456, 458, 460, 462 and 464 are now written into the control track 450 of the tape. The V(M) packets are still present in the vertical blanking interval line, so it is important that during a play operation (which the television knows because it commanded the mode of the VCR) that the V(M) packets be ignored so that the VISS marks are not written again. After a broadcast in the format shown in FIG. 15A, and the recording of that broadcast as described above, it is necessary for the user to obtain a key number by calling a 900 number in order to initialize the recording. The steps in this method are described in FIG. 16. After the recording of the broadcast the video cassette tape is rewind in step 470, then in step 472 the VCR 18 is commanded to play

1 the tape. As the tape is played the VBI decoder 24 decodes the vertical blanking
interval lines to retrieve key number 408 as shown in FIG. 15A. When still frame
command 410 is detected by the VBI decoder 24, a still frame command is sent
5 to VCR 18 in step 476. Then in step 478 the message 406 is displayed to the
user for the user to obtain a key number. In step 480 the user calls the 900
number to obtain the key number, and then in step 482 the user enters the key
number on the remote controller 12. In step 484 the key number is sent to the
television 10 or the controller 60, and in step 486 the entered key number is
10 compared with the key number retrieved from the vertical blanking interval lines.
If the numbers do not compare in step 488, then in step 490 the television 10
or the controller 60 are put into a mode of operation which does not allow the
television or controller to properly access programs on the recorded tape. If the
numbers do compare in step 488, then in step 492 the television 10 or controller
15 60 erase the message to obtain the key number as well as the key number 408
and the still frame command 410 from the recorded tape. This is done by
sending a stop command to the VCR followed by a rewind command for about
30 seconds, another stop command, record command for about 45 seconds and
then a stop command which effectively erases the message 406 and the key
20 number 408 as well as the still frame command 410. After the initialization the
format of the tape is as shown in FIG. 15B. This format is essentially the same
as the formats of FIGs. 11A and 11B, therefore the method described in FIG. 12
can be used by television 10 or controller 60 to control a VCR to access program
on the video tape cassette.

25 Thus, there has been described a television for controlling a video cassette
recorder to access programs on a video cassette tape.

The described embodiments of the invention are only considered to be
preferred and illustrative of the inventive concept, the scope of the invention is
not to be restricted to such embodiments. Various and numerous other
arrangements may be devised by one skilled in the art without departing from the
30 spirit and scope of this invention.

It is therefore intended by the appended claims to cover any and all such
applications, modifications and embodiments within the scope of the present
invention.

1 **WHAT IS CLAIMED IS:**

1. A television for controlling a video cassette recorder to access programs on a video cassette tape, the television comprising:
- 5 means for retrieving a directory of programs from a television signal received from the video cassette recorder;
- means for retrieving a program identifier from the television signal received from the video cassette recorder;
- means for displaying the directory of programs to allow a user to select a program from the directory;
- 10 means for determining from the retrieved program identifier and the selected program the amount to either advance or rewind the video cassette tape to position the video cassette tape in the video cassette recorder at the beginning of the selected program; and
- means for commanding the video cassette recorder to position the video cassette tape at the beginning of the selected program.
- 15

2. The television of claim 1 further comprising a means for storing the retrieved directory of programs.

- 20 3. The television of claim 1 wherein the means for retrieving a directory of programs from a television signal comprises a vertical blanking interval decoder.

4. The television of claim 3 wherein the means for retrieving a program identifier from the television signal comprises a vertical blanking interval decoder.
- 25

5. The television of claim 4 wherein the means for commanding the video cassette recorder to position the video cassette tape at the beginning of the selected program comprises:
- 30 means for determining from the retrieved program identifier and the selected program a first number of index marks to either advance or rewind the video cassette tape to the beginning of the selected program; and
- means for commanding the video cassette recorder to advance or
- 35 rewind the first number of index marks.

- 1 6. The television of claim 5 wherein the program identifier comprises
a program number.
- 5 7. The television of claim 1 wherein the means for displaying the
directory of programs further comprises an on screen display controller.
8. The television of claim 1 further comprising means for selecting a
program.
- 10 9. The television of claim 8 wherein the means for selecting a
program comprises a means for using a cursor to select a program from the
displayed directory.
- 15 10. The television of claim 1 further comprising means for commanding
the video cassette recorder to play the selected program.
11. The television of claim 1 further comprising means for commanding
the video cassette recorder to record at a later time a second program associated
with the selected program.
- 20 12. The television of claim 11 wherein the means for commanding the
video cassette recorder to record at a later time a second program associated
with the selected program comprises a means for decoding and expanding a
compressed code, representative of, and compressed in length from, the
25 combination of a channel, a date, a time-of-day, and a length for a program
coupled to said means for commanding.
13. The television of claim 1 further comprising a remote controller.
- 30 14. The television of claim 10 further comprising:
 means for retrieving from the television signal an end of program
indication; and
 means for commanding the video cassette recorder to stop playing
the video cassette tape upon retrieval of the end of program indication.
- 35

- 1 15. The television of claim 14 wherein the means for retrieving from
the television signal an end of program indication comprises a vertical blanking
line decoder.
- 5 16. The television of claim 1 further comprising a means for
transmitting a command to the video cassette recorder.
17. The television of claim 16 wherein the means for transmitting a
command to the video cassette recorder comprises an infrared emitter.
- 10 18. The television of claim 1 further comprising:
 means for retrieving an index indication from a received television
broadcast signal being recorded by the video cassette recorder on the video
cassette tape; and
- 15 means for sending an index mark command to the video cassette
recorder in response to retrieving the index indication from the received television
broadcast signal to cause an index mark to be written by the video cassette
recorder on the video cassette tape.
- 20 19. The television of claim 18 wherein the means for retrieving an
index indication from a received television broadcast signal comprises a vertical
blanking interval decoder.
20. A television for controlling a video cassette recorder to access
programs on a video cassette tape, the television comprising:
- 25 means for retrieving a guide of programs from a television signal
received from the video cassette recorder;
 means for retrieving guide data associated with the guide of
programs from the television signal received from the video cassette recorder;
- 30 means for retrieving a still frame indication from the television
signal received from the video cassette recorder;
 means for sending a still frame command to the video cassette
recorder in response to retrieving a still frame indication;
- means for displaying the guide of programs to allow a user to
35 select a program from the guide;

1 means for determining from the retrieved guide data the amount
to either advance or rewind the video cassette tape to position the video cassette
tape in the video cassette recorder at the beginning of the selected program; and
means for commanding the video cassette recorder to position the
5 video cassette tape at the beginning of the selected program.

21. The television of claim 20 further comprising a means for storing
the retrieved guide and retrieved guide data.

10 22. The television of claim 20 wherein the means for retrieving guide
data comprises a vertical blanking interval decoder.

23. The television of claim 22 wherein the means for retrieving a still
frame indicator from the television signal comprises a vertical blanking interval
15 decoder.

24. The television of claim 23 wherein the means for commanding the
video cassette recorder to position the video cassette tape at the beginning of
a program selected from the guide comprises:

20 means for determining from the retrieved guide data a first number
of index marks to either advance or rewind the video cassette tape to the
beginning of the selected program; and

means for commanding the video cassette recorder to advance or
rewind the first number of index marks.

25 25. The television of claim 20 wherein the means for displaying the
guide further comprises an on screen display controller.

26. The television of claim 20 further comprising means for selecting
30 a program.

27. The television of claim 26 wherein the means for selecting a
program comprises a means for using a cursor to select a program from the
displayed guide.

35 28. The television of claim 20 further comprising means for
commanding the video cassette recorder to play the selected program.

1 29. The television of claim 20 further comprising means for
commanding the video cassette recorder to record at a later time a second
program associated with the selected program.

5 30. The television of claim 29 wherein the means for commanding the
video cassette recorder to record at a later time a second program associated
with the selected program comprises a means for decoding and expanding a
compressed code, representative of, and compressed in length from, the
10 combination of a channel, a date, a time-of-day, and a length for a program
coupled to said means for commanding.

31. The television of claim 20 further comprising a remote controller.

15 32. The television of claim 20 further comprising a means for
transmitting a command to the video cassette recorder.

33. The television of claim 32 wherein the means for transmitting a
command to the video cassette recorder comprises an infrared emitter.

20 34. The television of claim 20 further comprising:
means for retrieving an index indication from a received television
broadcast signal being recorded by the video cassette recorder on the video
cassette tape; and
means for sending an index mark command to the video cassette
25 recorder in response to retrieving the index indication from the received television
broadcast signal to cause an index mark to be written by the video cassette
recorder on the video cassette tape.

30 35. The television of claim 34 wherein the means for retrieving an
index indication from a received television broadcast signal comprises a vertical
blanking interval decoder.

35 36. A method for controlling a video cassette recorder from a television
to access programs on a video cassette tape, the method comprising the steps
of:

providing a video cassette tape having a first length of video
cassette tape having a first index mark written near the beginning of the first

1 length and a second index mark written near the end of the first length, a guide
to programs on the video cassette tape written between the first and second
index mark, and guide data written between the first and second index mark, the
guide data associated with the guide including for each program contained on the
5 video cassette tape a number of index marks either forward or backward on the
tape from the guide data to the program; and

providing a plurality of programs on the video cassette tape, each
program having a third index mark written near the beginning of the program and
a fourth index mark written near the end of the program.

10

37. The method of Claim 36 further comprising the steps of:
playing the video cassette tape on the video cassette recorder and
sending the video cassette recorder output signal to the television;
retrieving the guide data from the output signal with a video
15 blanking interval decoder in the television;
detecting a still frame command in the output signal with a video
blanking interval decoder in the television;
sending a still frame command from the television to the video
cassette recorder to freeze the guide on the output signal; and
20 displaying the guide on the television for the user to select a
program from the guide.

38. The method of Claim 37 further comprising the steps of:
commanding the video cassette recorder from the television to
25 advance or rewind the video cassette tape to the selected program by advancing
or rewinding a number of index marks according to the guide data associated
with the selected program; and
sending a command to the video cassette recorder to play the
selected program.

30

39. The method of Claim 37 further comprising the step of
commanding the video cassette recorder to record at a later time a second
program identified in the guide data associated with the selected program.

35 40. The method of Claim 39 further comprising the step of decoding
and expanding a compressed code, representative of, and compressed in length

1 from, the combination of a channel, a date, a time-of-day, and a length for the
second program.

41. The method of Claim 36 further comprising the step of delivering
5 the video cassette tape to the homes of users.

42. ~~just~~ The method of Claim 41 wherein the step of delivering the video
cassette tape to the homes of users further comprises the step of delivering the
video cassette tape along with a newspaper to the homes of users.

10 43. A method for controlling a video cassette recorder from a television
to access programs on a video cassette tape, the method comprising the steps
of:

15 broadcasting a television signal for a first length of time, the
television signal having an initialization message to obtain a key number,
broadcasting a key number in the vertical blanking interval of the television
signal, and broadcasting a still frame command in the vertical blanking interval
of the television signal;

20 broadcasting a television signal for a second length of time, the
television signal having a first index mark in the vertical blanking interval near the
beginning of the second length and a second index mark in the vertical blanking
interval near the end of the second length, a guide to programs broadcast
between the first and second index mark, guide data associated with the guide
25 broadcast between the first and second index mark, the guide data including for
each program contained in the broadcast a number of index marks either forward
or backward in the broadcast from the guide data to the program, and
broadcasting a still frame command near the second index mark; and

30 broadcasting a television signal for a third length of time, the
television signal having a plurality of programs, each program having a third index
mark broadcast in the vertical blanking interval near the beginning of the program
and a fourth index mark broadcast in the vertical blanking interval near the end
of the program.

44. The method of Claim 43 further comprising the steps of:
35 recording the broadcast on a video cassette tape with a video
cassette recorder as the broadcast is received;
ignoring any still frame commands in the broadcast; and

1 detecting with a vertical blanking interval decoder in the television
any index marks in the broadcast and for each index mark detected in the
broadcast sending a index mark command from the television to the video
cassette recorder to write an index mark on the video cassette tape as the
5 broadcast is recorded on the video cassette tape.

45. The method of Claim 44 further comprising the steps of:
rewinding the video cassette tape after the broadcast is complete;
playing the video cassette tape;
10 retrieving the broadcast key number with a vertical blanking
interval decoder in the television;
detecting a still frame command with a vertical blanking interval
decoder in the television; and
displaying the initialization message to obtain a key number.

15 46. The method of Claim 45 further comprising the step of requiring
the user to obtain and enter a key number.

20 47. The method of Claim 46 further comprising the steps of:
comparing the entered key with the broadcast key number;
if the entered key and the key indication compare then erasing a
first length of video cassette tape corresponding to the first length of the
broadcast; and
if the entered key and the key indication do not compare then not
25 erasing a first length of video cassette tape corresponding to the first length of
the broadcast.

48. An apparatus for allowing a television to control a video cassette
recorder to access programs on a video cassette tape, the apparatus comprising:
30 a video cassette tape having a first length of video cassette tape
having a first index mark written near the beginning of the first length and a
second index mark written near the end of the first length, a guide to programs
on the video cassette tape written between the first and second index mark, and
guide data written between the first and second index mark, the guide data
35 associated with the guide including for each program contained on the video
cassette tape a number of index marks either forward or backward on the tape
from the guide data to the program; and

1 a plurality of programs on the video cassette tape, each program
having a third index mark written near the beginning of the program and a fourth
index mark written near the end of the program.

5 49. The apparatus of Claim 48 wherein the guide comprises an index
of programs contained on the video cassette tape.

 50. A method for a television to control a video cassette recorder to
access programs on a video cassette tape, the method comprising the step of
10 providing a plurality of programs on a video cassette tape, each program having
a first index mark written near the beginning of the program and a second index
mark written near the end of the program, a directory of programs written in a
vertical blanking interval between the first and second index marks, and a
program identifier written in a vertical blanking interval between the first and
15 second index marks.

 51. The method of claim 50 further comprising the steps of:
 playing the video cassette tape on the video cassette recorder and
 sending the video cassette recorder output signal to the television;
20 retrieving the directory of programs' from the vertical blanking
interval of the output signal received from the video cassette recorder;
 retrieving a program identifier from the vertical blanking interval of
the output signal received from the video cassette recorder;
 displaying the directory of programs to allow a user to select a
25 program from the directory;
 determining from the retrieved program identifier and the selected
program the amount to either advance or rewind the video cassette tape to
position the video cassette tape in the video cassette recorder at the beginning
of the selected program; and
30 commanding the video cassette recorder to position the video
cassette tape at the beginning of the selected program.

 52. The method of claim 51 further comprising the step of storing the
retrieved directory of programs.

35

- 1 53. The method of Claim 51 wherein the step of commanding the video cassette recorder to position the video cassette tape at the beginning of the selected program comprises the steps of:
- 5 determining from the retrieved program identifier and the selected program a first number of index marks to either advance or rewind the video cassette tape to the beginning of the selected program; and
- commanding the video cassette recorder to advance or rewind the first number of index marks.
- 10 54. The method of claim 51 further comprising the step of selecting a program from the directory.
55. The method of claim 54 wherein the step of selecting a program comprises the step of using a cursor to select a program from the displayed directory.
- 15 56. The method of claim 51 further comprising the step of commanding the video cassette recorder to play the selected program.
- 20 57. The method of claim 51 further comprising the step of commanding the video cassette recorder to record at a later time a second program associated with the selected program.
58. The method of claim 57 wherein the step of commanding the video cassette recorder to record at a later time a second program associated with the selected program comprises the step of decoding and expanding a compressed code, representative of, and compressed in length from, the combination of a channel, a date, a time-of-day, and a length for a program coupled to said means for commanding.
- 25 59. The method of claim 56 further comprising the step of:
- retrieving from the output signal with a vertical blanking interval decoder in the television an end of program indication; and
- 30 commanding the video cassette recorder to stop playing of the video cassette tape upon retrieval of the end of program indication.
- 35

1 60. The method of claim 51 further comprising the steps of:
 retrieving an index indication with a vertical blanking interval
 decoder in the television from a received television broadcast signal being
 recorded by the video cassette recorder on the video cassette tape; and
5 sending an index mark command to the video cassette recorder in
 response to retrieving the index indication from the received television broadcast
 signal to cause an index mark to be written by the video cassette recorder on the
 video cassette tape.

10 61. The method of Claim 50 further comprising the step of delivering
 the video cassette tape to the homes of users.

 62. The method of Claim 61 wherein the step of delivering the video
 cassette tape to the homes of users further comprises the step of delivering the
15 video cassette tape along with a newspaper to the homes of users.

 63. An apparatus for controlling a video cassette recorder to access
 programs on a video cassette tape, the apparatus comprising:
 means for retrieving a guide of programs from a television signal
20 received from the video cassette recorder;
 means for retrieving guide data associated with the guide of
 programs from the television signal received from the video cassette recorder;
 means for retrieving a still frame indication from the television
 signal received from the video cassette recorder;
25 means for sending a still frame command to the video cassette
 recorder in response to retrieving a still frame indication;
 means for displaying the guide of programs to allow a user to
 select a program from the guide;
 means for determining from the retrieved guide data the amount
30 to either advance or rewind the video cassette tape to position the video cassette
 tape in the video cassette recorder at the beginning of the selected program; and
 means for commanding the video cassette recorder to position the
 video cassette tape at the beginning of the selected program.

35 64. The apparatus of claim 63 further comprising a means for storing
 the retrieved guide and retrieved guide data.

1 65. The apparatus of claim 63 wherein the means for retrieving guide data comprises a vertical blanking interval decoder.

5 66. The apparatus of claim 65 wherein the means for retrieving a still frame indicator from the television signal comprises a vertical blanking interval decoder.

10 67. The apparatus of claim 66 wherein the means for commanding the video cassette recorder to position the video cassette tape at the beginning of a program selected from the guide comprises:

 means for determining from the retrieved guide data a first number of index marks to either advance or rewind the video cassette tape to the beginning of the selected program; and

15 means for commanding the video cassette recorder to advance or rewind the first number of index marks.

20 68. The apparatus of claim 63 wherein the means for displaying the guide of programs to allow a user to select a program from the guide comprises an on screen display controller.

25 69. The apparatus of claim 63 further comprising means for selecting a program.

30 70. The apparatus of claim 69 wherein the means for selecting a program comprises a means for using a cursor to select a program from the displayed guide.

35 71. The apparatus of claim 63 further comprising means for commanding the video cassette recorder to play the selected program.

40 72. The apparatus of claim 63 further comprising means for commanding the video cassette recorder to record at a later time a second program associated with the selected program.

45 73. The apparatus of claim 72 wherein the means for commanding the video cassette recorder to record at a later time a second program associated with the selected program comprises a means for decoding and expanding a

1 compressed code, representative of, and compressed in length from, the
combination of a channel, a date, a time-of-day, and a length for a program
coupled to said means for commanding.

5 74. The apparatus of claim 63 further comprising a remote controller.

75. The apparatus of claim 63 further comprising a means for
transmitting a command to the video cassette recorder.

10 76. The apparatus of claim 63 wherein the means for transmitting a
command to the video cassette recorder comprises an infrared emitter.

77. The apparatus of claim 63 further comprising:
means for retrieving an index indication from a received television
15 broadcast signal being recorded by the video cassette recorder on the video
cassette tape; and

means for sending an index mark command to the video cassette
recorder in response to retrieving the index indication from the received television
broadcast signal to cause an index mark to be written by the video cassette
20 recorder on the video cassette tape.

78. The apparatus of claim 77 wherein the means for retrieving an
index indication from a received television broadcast signal comprises a vertical
blanking interval decoder.

25 79. An apparatus for controlling a video cassette recorder to access
programs on a video cassette tape therein, the apparatus comprising:

means for detecting video signals received from the video cassette
recorder;

30 means for sending to the video cassette recorder commands for
controlling the operation of the video cassette recorder, the commands including
index mark, play, advance, rewind and record;

means for retrieving a guide of programs from the detected video
signals;

35 means for retrieving guide data associated with the retrieved guide
of programs;

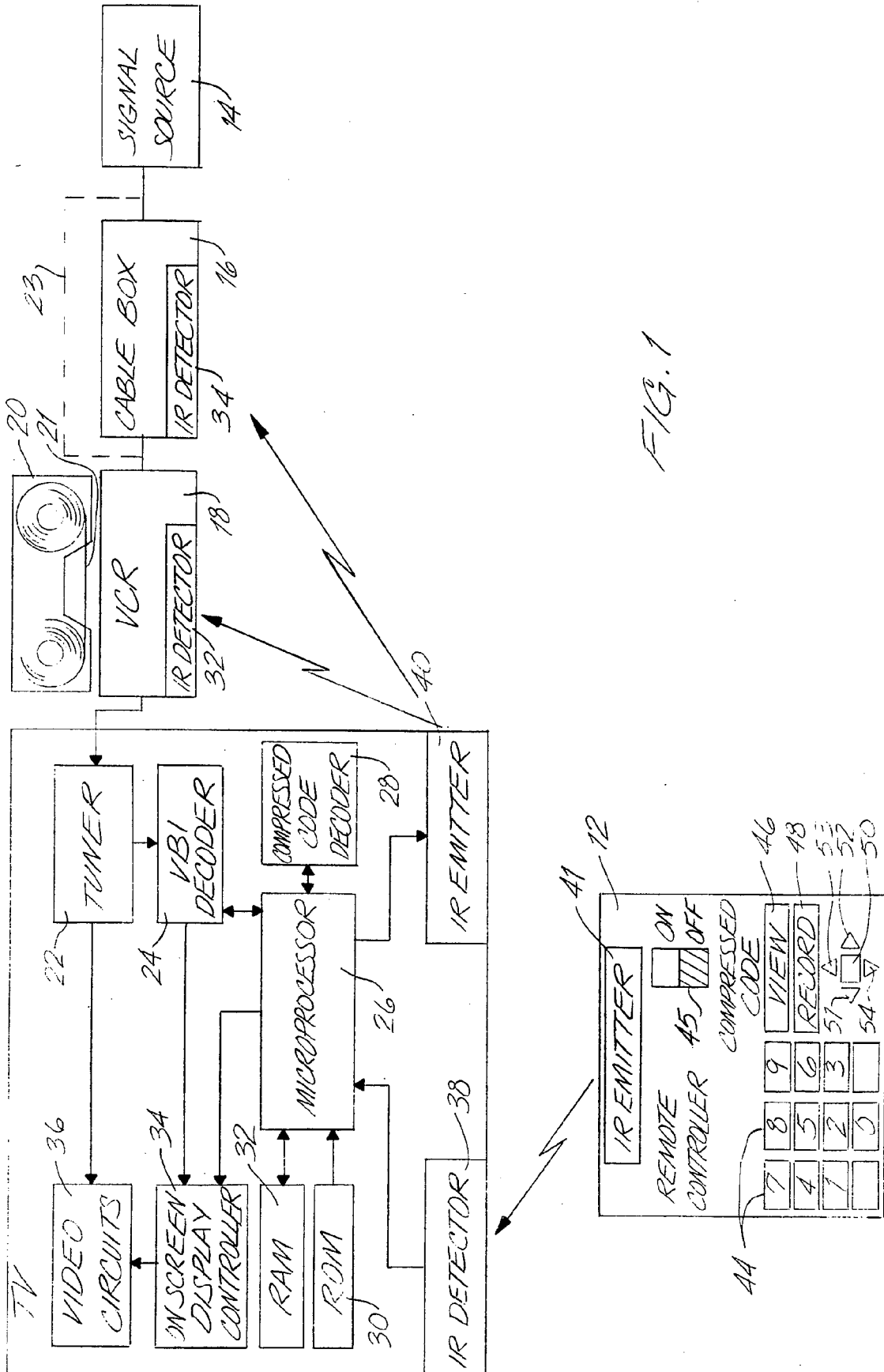
1 means for displaying the guide of programs to allow a user to
select a program from such guide;
 means for determining from the retrieved guide data the amount
to either advance or rewind the video cassette tape to position such tape in the
5 video cassette recorder at the beginning of the selected program;
 means for retrieving an index indication from the detected video
signals; and
 a controller for commanding the sending means to send an
advance or rewind command to position the tape at the beginning of the selected
10 program in response to the determined amount to advance or rewind the tape,
and when the video cassette recorder is in the record mode to send, in response
to a retrieved index indication, an index mark command to the video cassette
recorder to cause an index mark to be written by such recorder on the video
cassette tape and when the video cassette recorder is in the play mode to ignore
15 such index indication.

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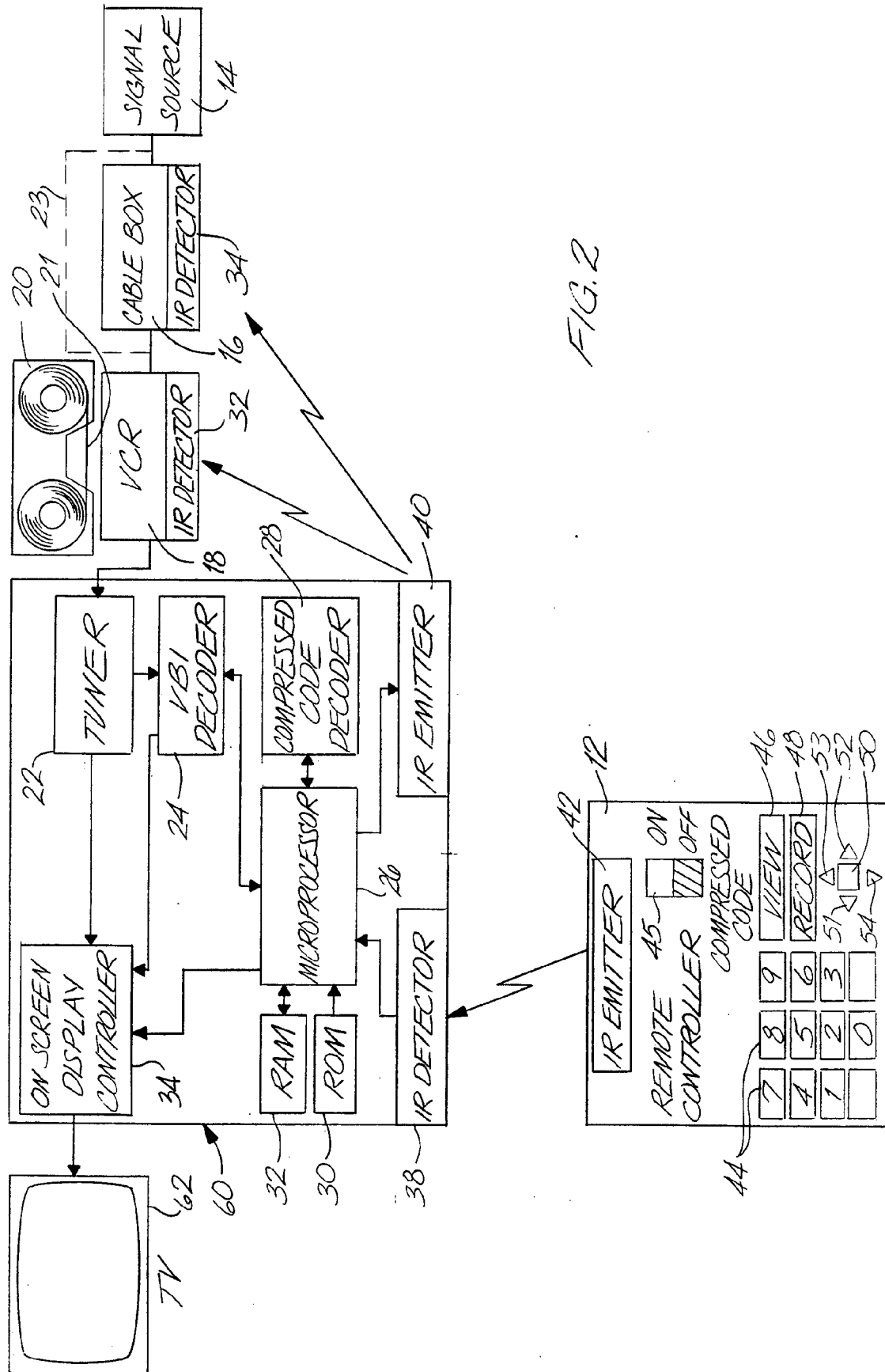


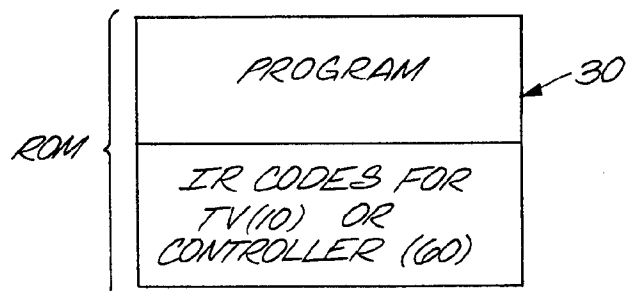
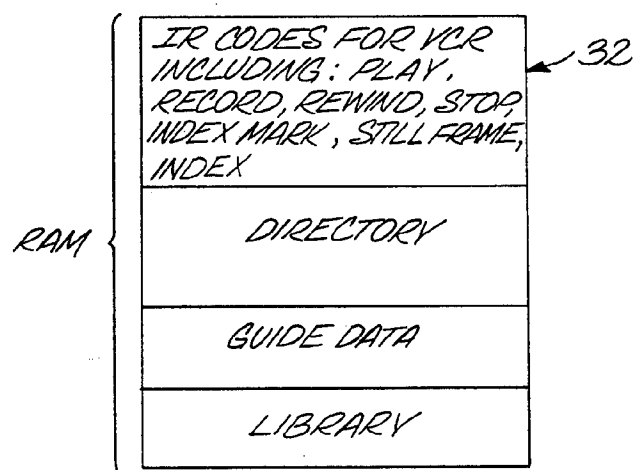
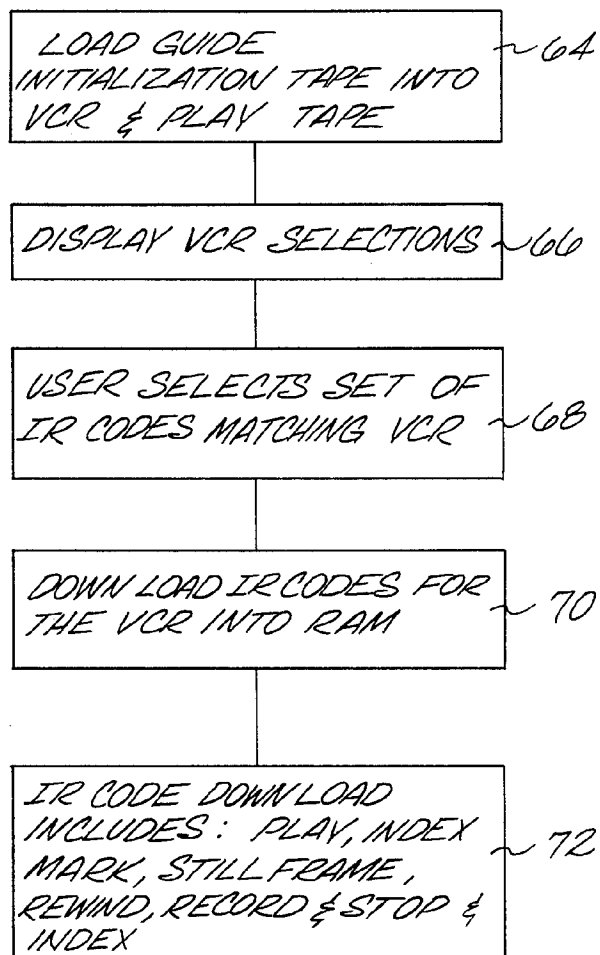
Fig. 3A*Fig. 3B*

Fig. 3C

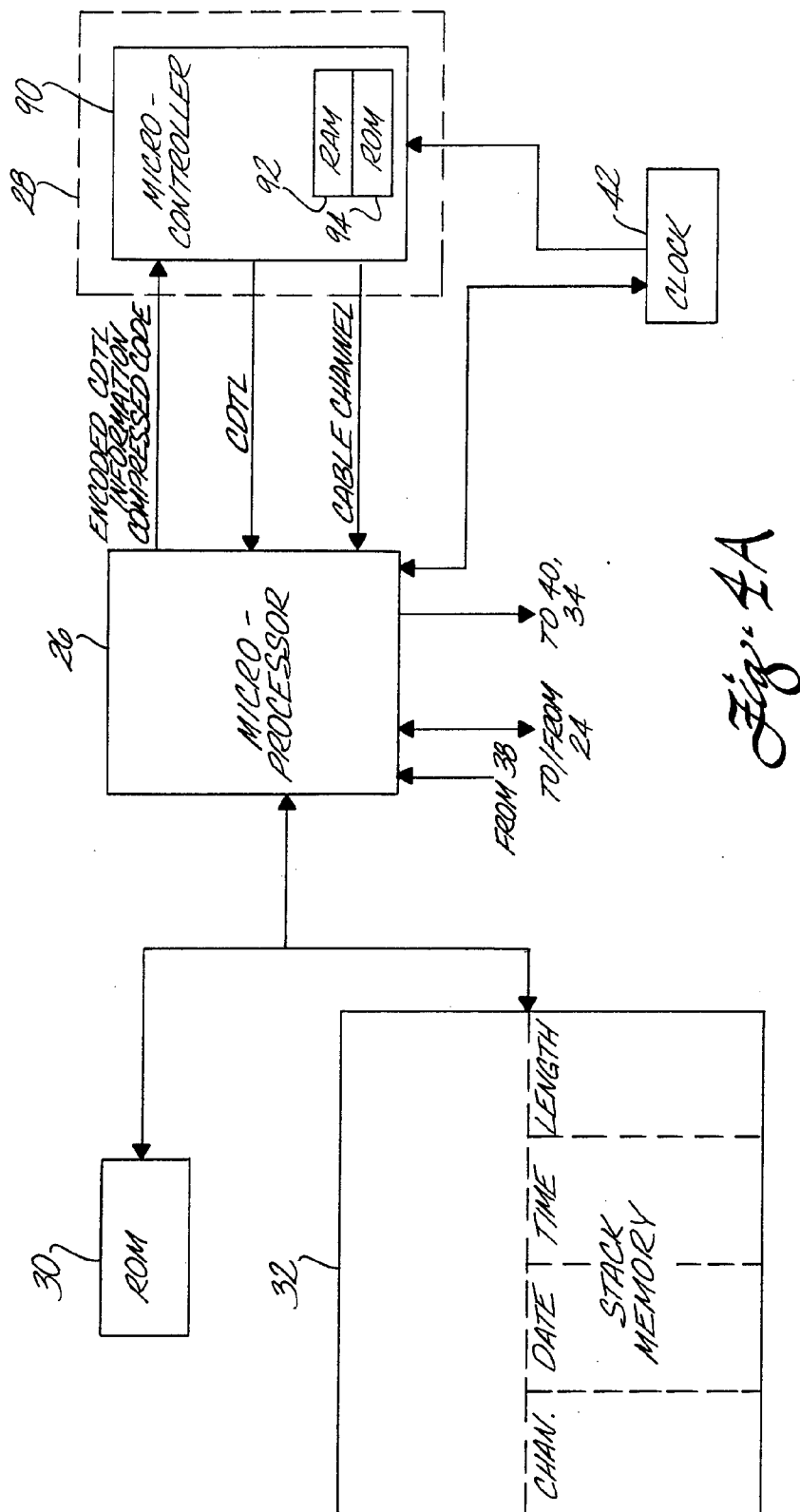
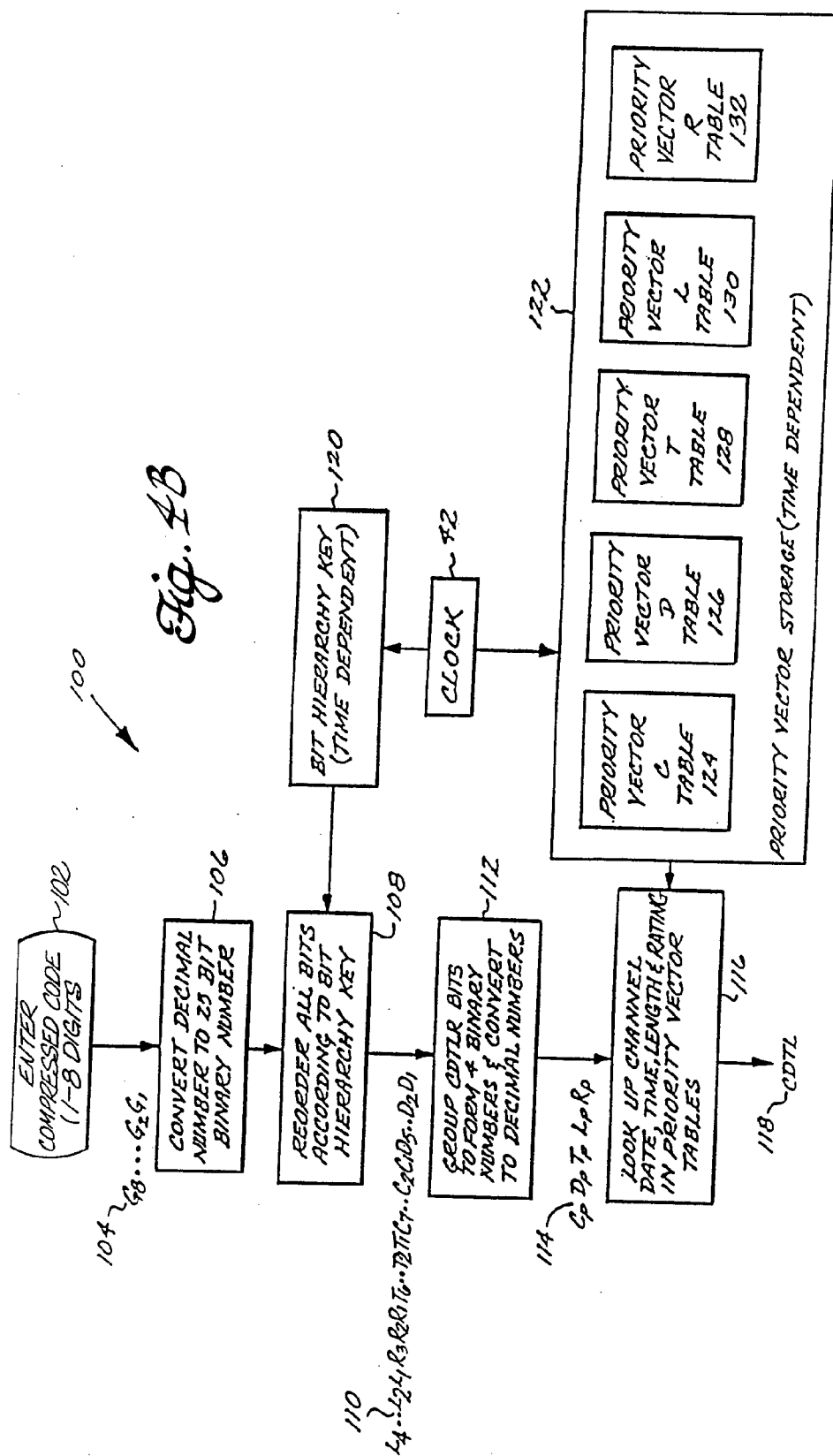


Fig. 4A



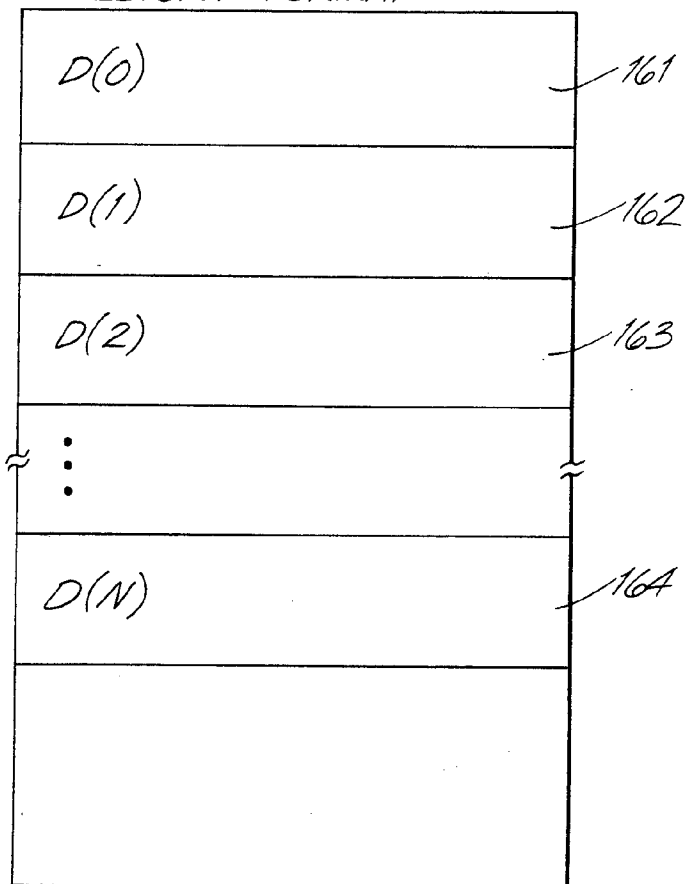
*Fig. 6A**DIRECTORY FORMAT*

Fig. 6B

LIBRARY FORMAT

166



TAPE NO. 1

TARZAN
TERMINATOR

TAPE NO. 2

CAR GUIDE

MERCEDES VIDEO CLIP
LEXUS VIDEO CLIP

SPORTS GUIDE

NFL MONDAY NITE FOOTBALL CLIP
NHL PREVIEWS

TAPE NO. 3

RESTAURANT GUIDE

ALICES RESTAURANT
MADEO'S
22ND ST. LANDING

⋮

TAPE NO. 4

⋮

Fig. 6C

D(N) FORMAT ON VBI LINE 20

ADDITIONAL FIELDS	PROGRAM NUMBER(N)	START ADDRESS	END ADDRESS	RECORD SPEED	COMPRESSED CODE	CHANNEL, DATE TIME-OF-DAY, LENGTH	PROGRAM IDENTIFIER	TITLE
	172	174	176	178	180	182	184	186

Fig. 7

TPA PACKET FORMAT ON VBI LINE 19

TAPE IDENTIFICATION(TID)	PROGRAM NUMBER(N)	ABSOLUTE ADDRESS(AA)
188	190	192

FIG. 8

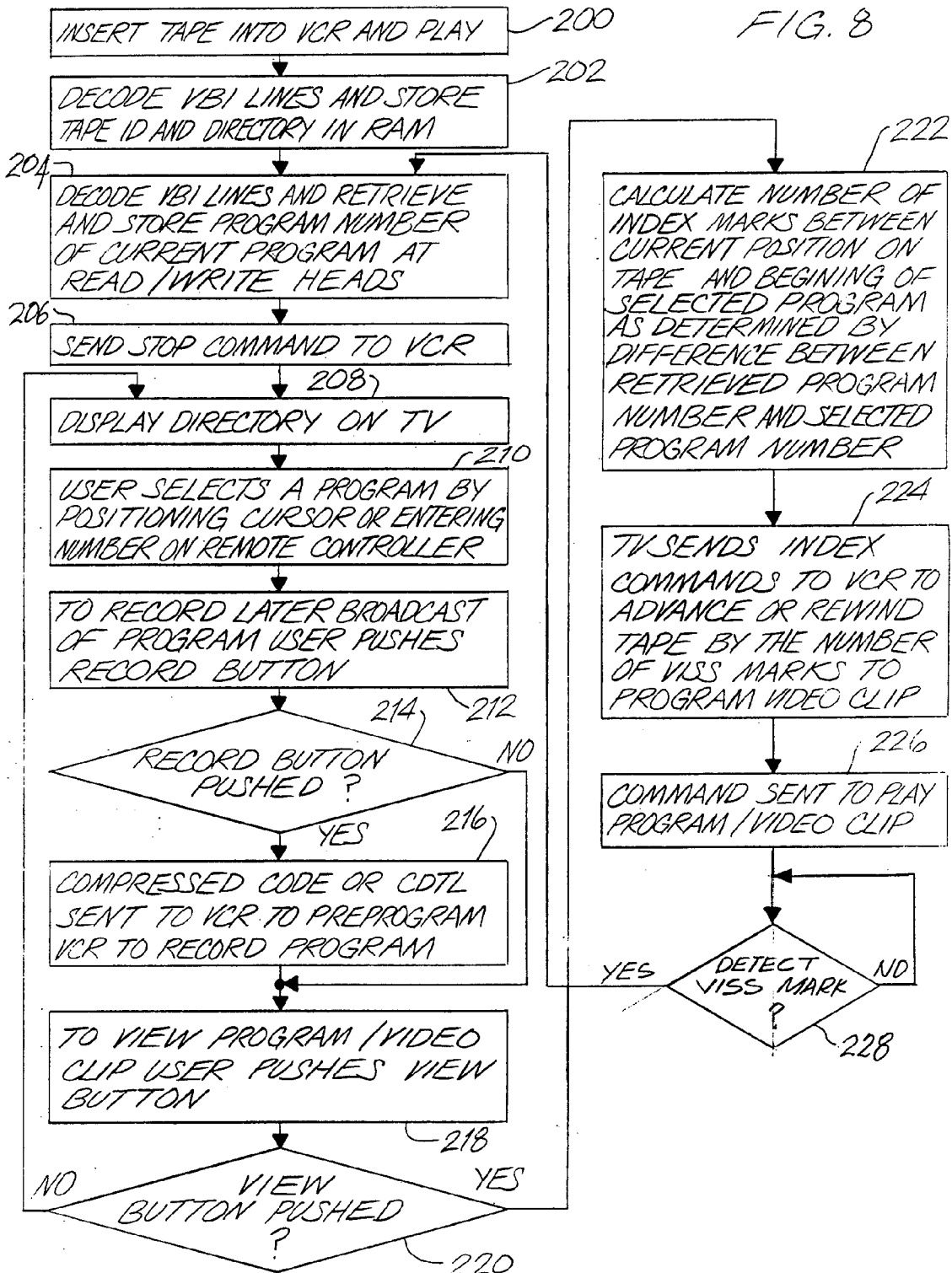


Fig. 9

INDEX TAPE NO. 8

1. TITLE _____ MIN

2. WHEEL OF FORTUNE 30

3. ENTERTAINMENT TONITE 30

4. MURPHY BROWN (CH 2, 10/17, 1 PM) (5941) 30

5. TERMINATOR 90

END 60

HIGHLIGHT SELECTION

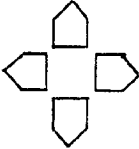


Fig. 10

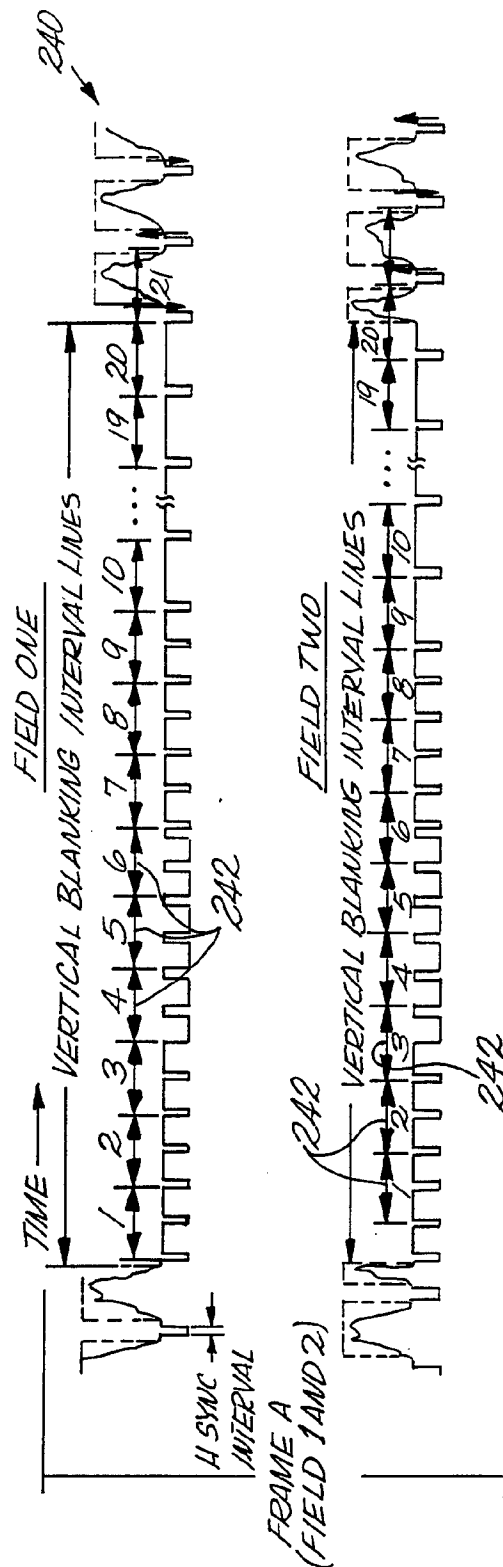


Fig. 11A

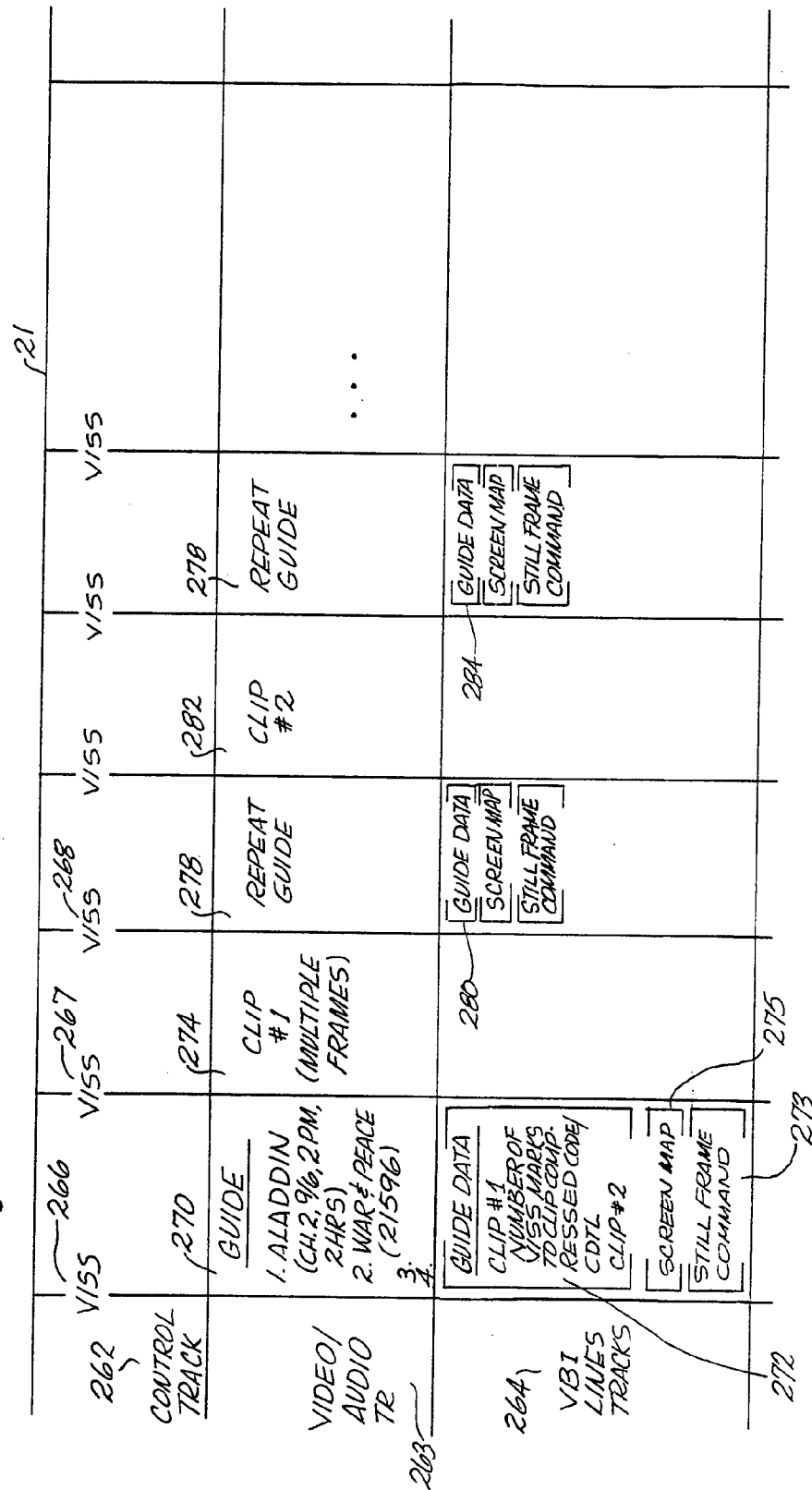


Fig. 11B

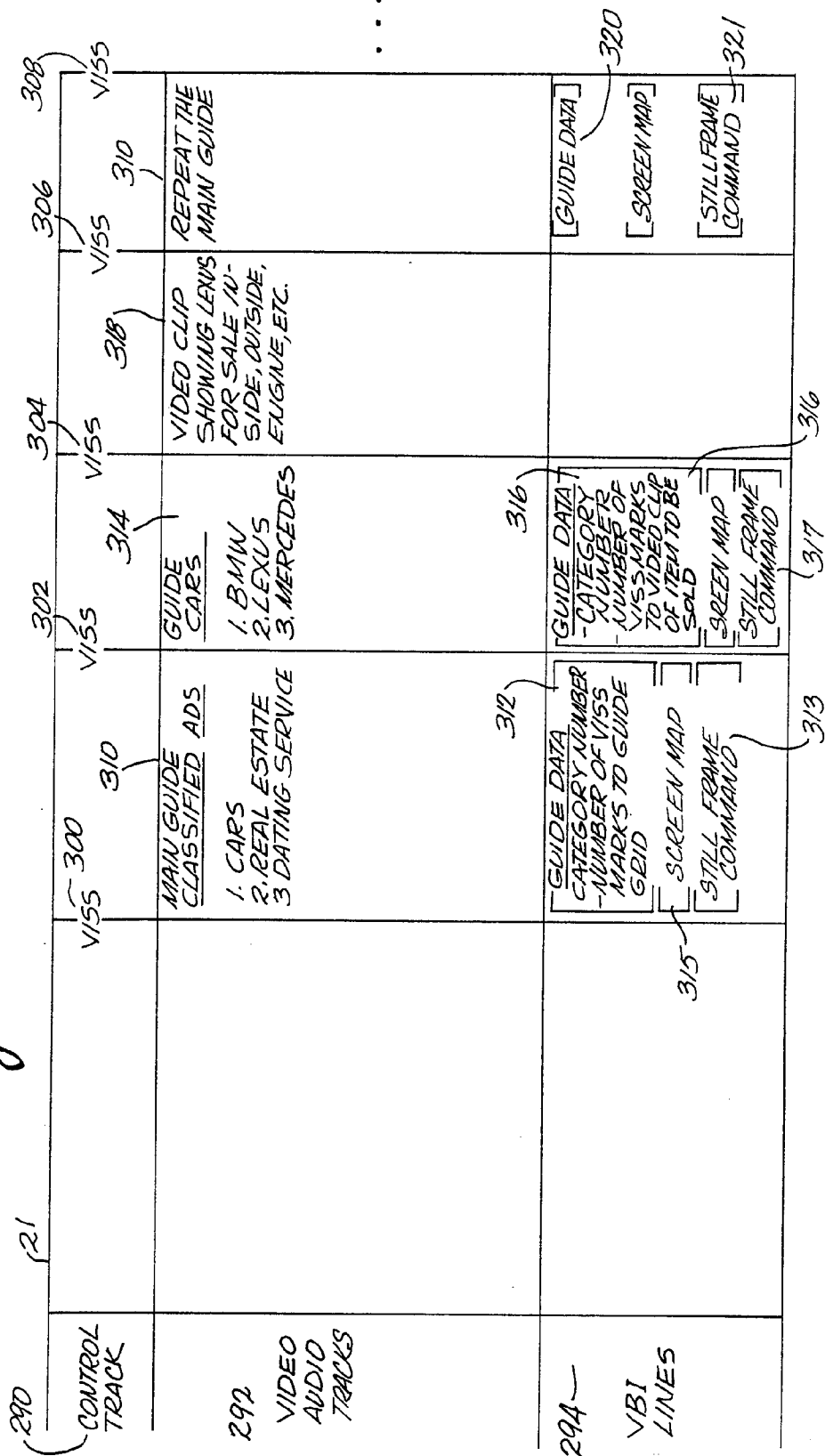


Fig. 12

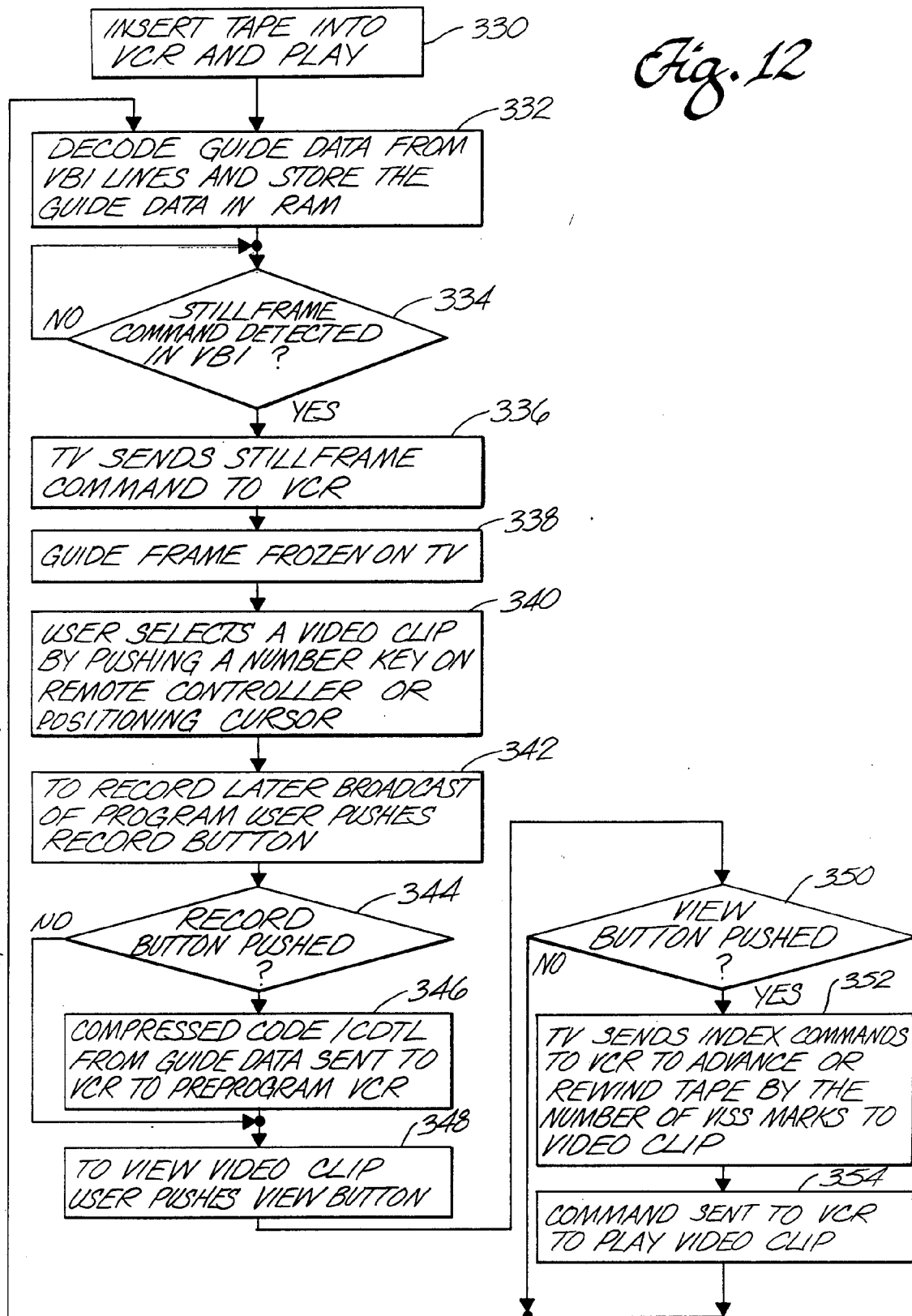


Fig. 13A

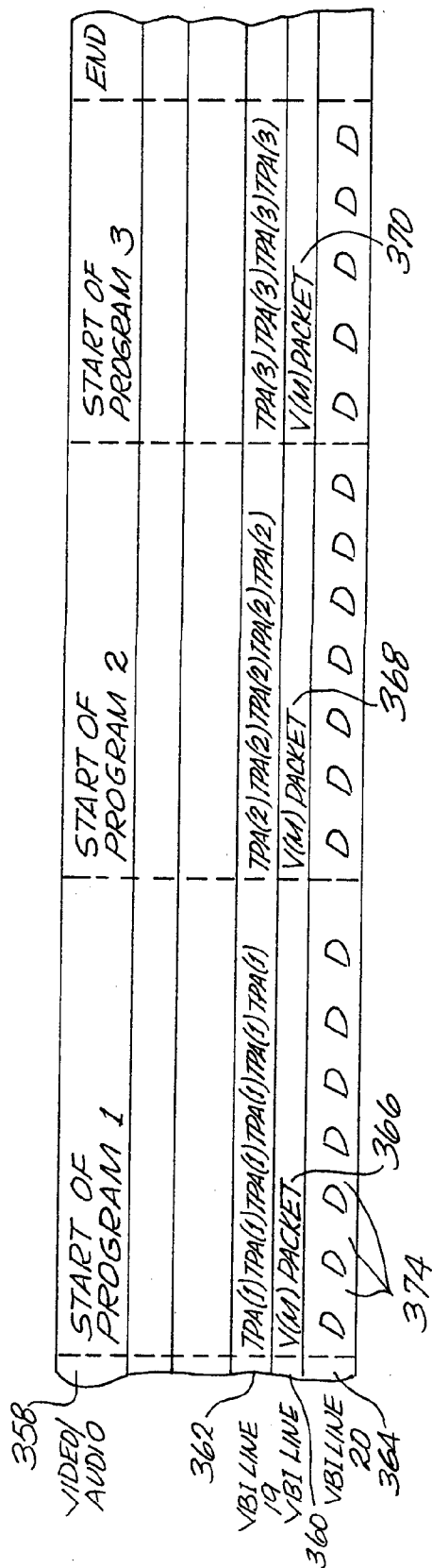
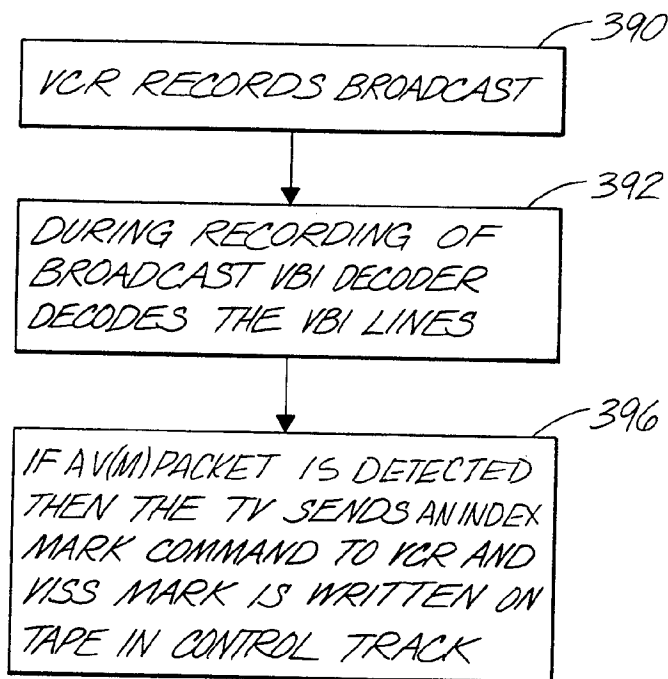


Fig. 14

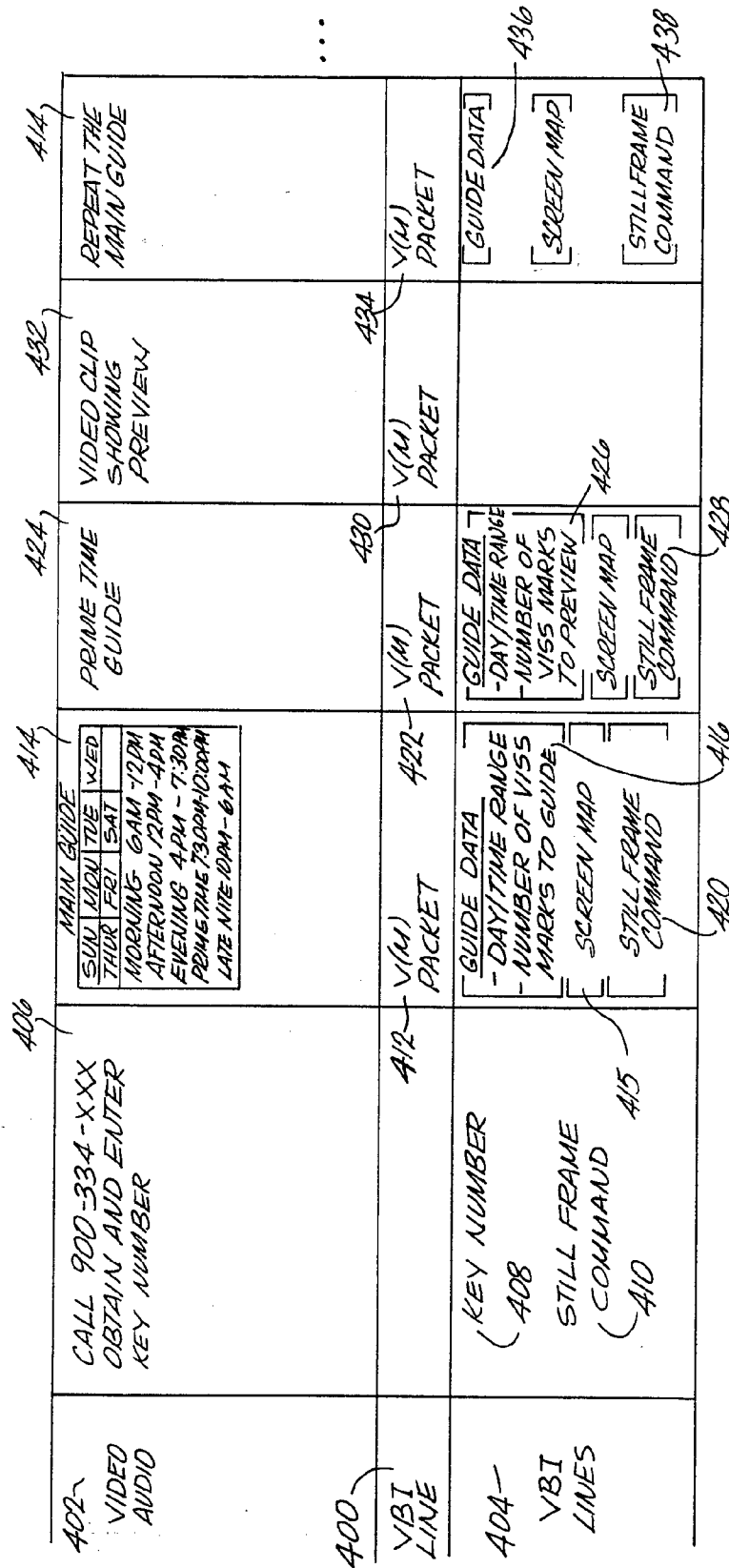


Fig. 15A

Fig. 15B

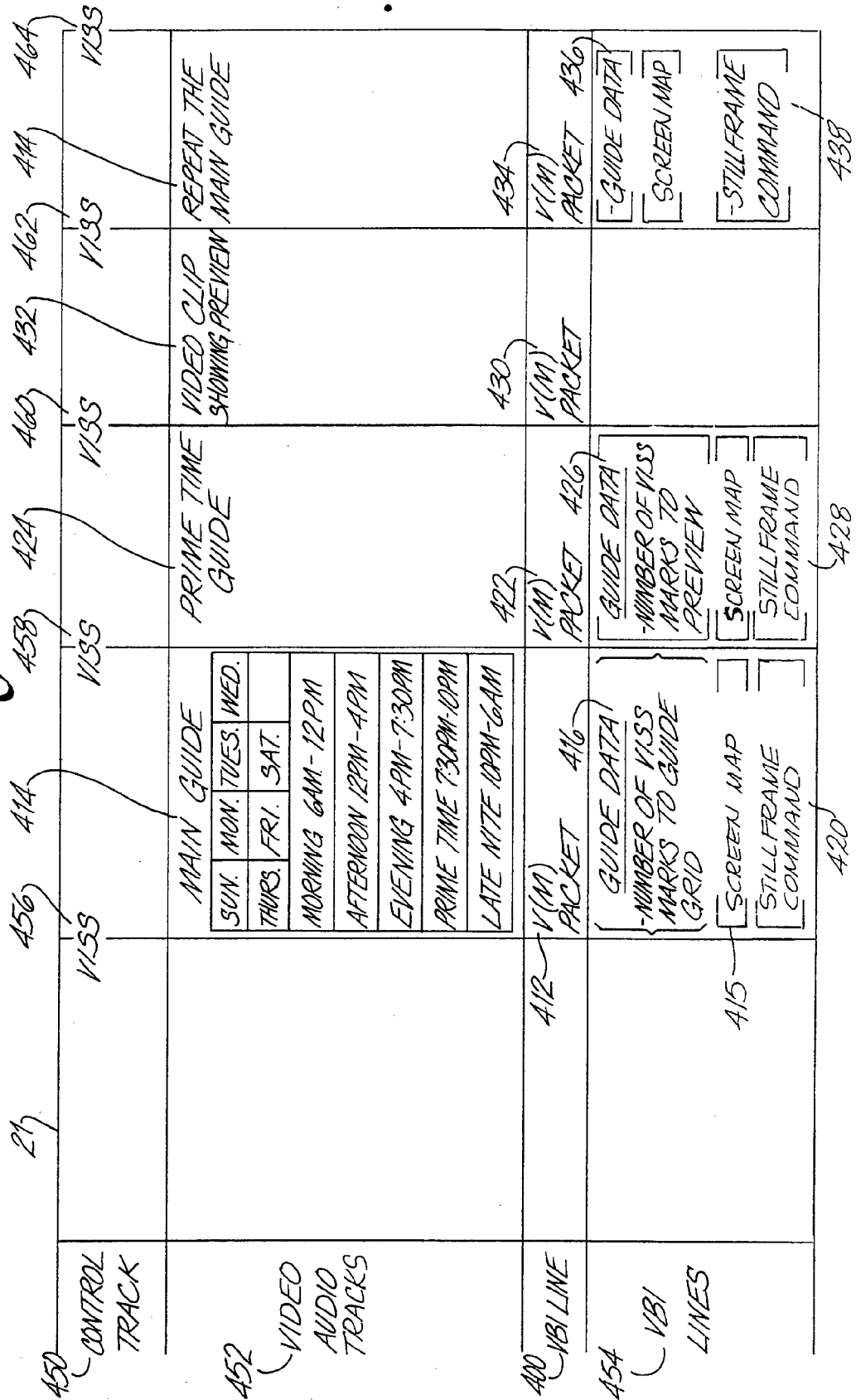


Fig. 16

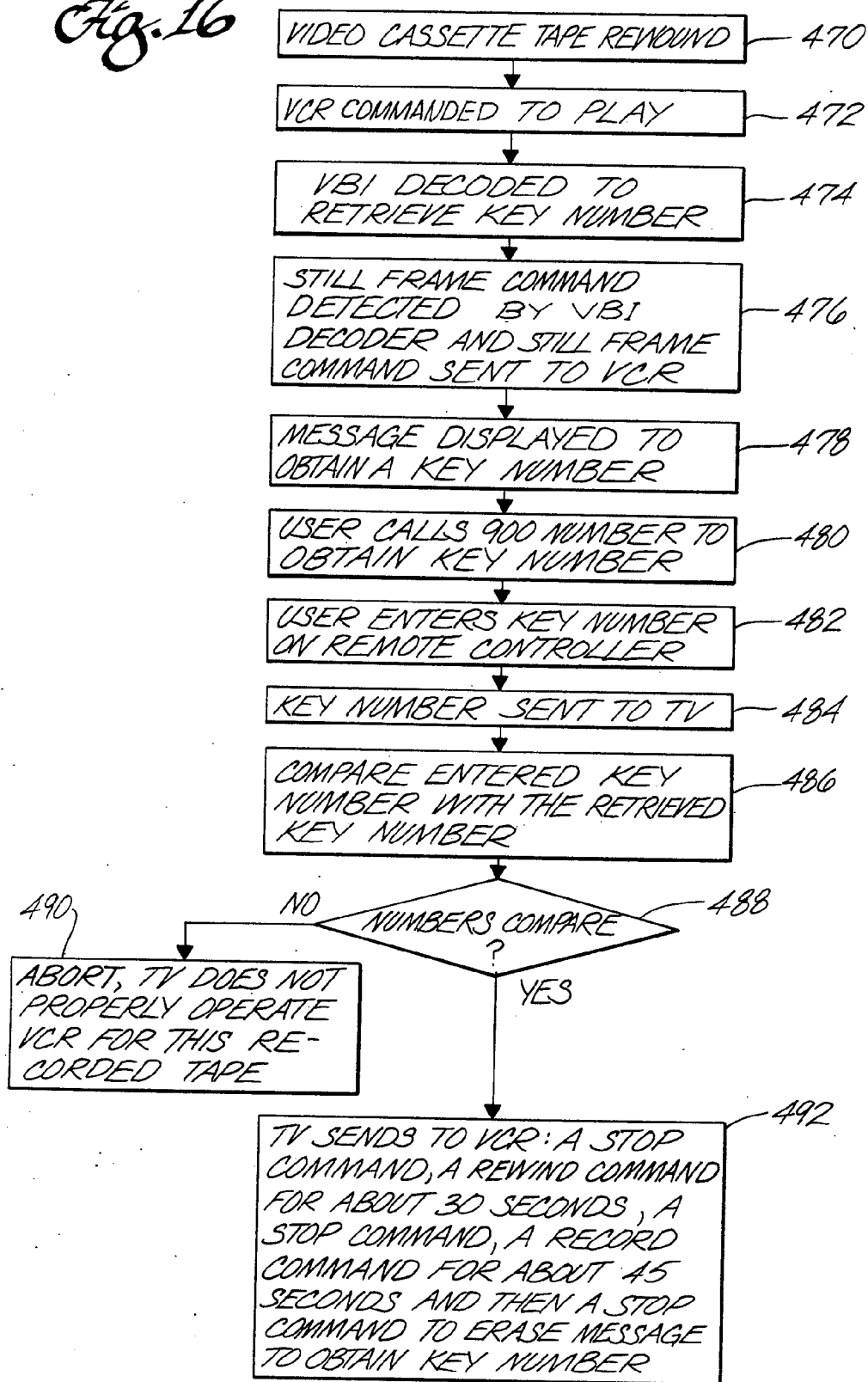
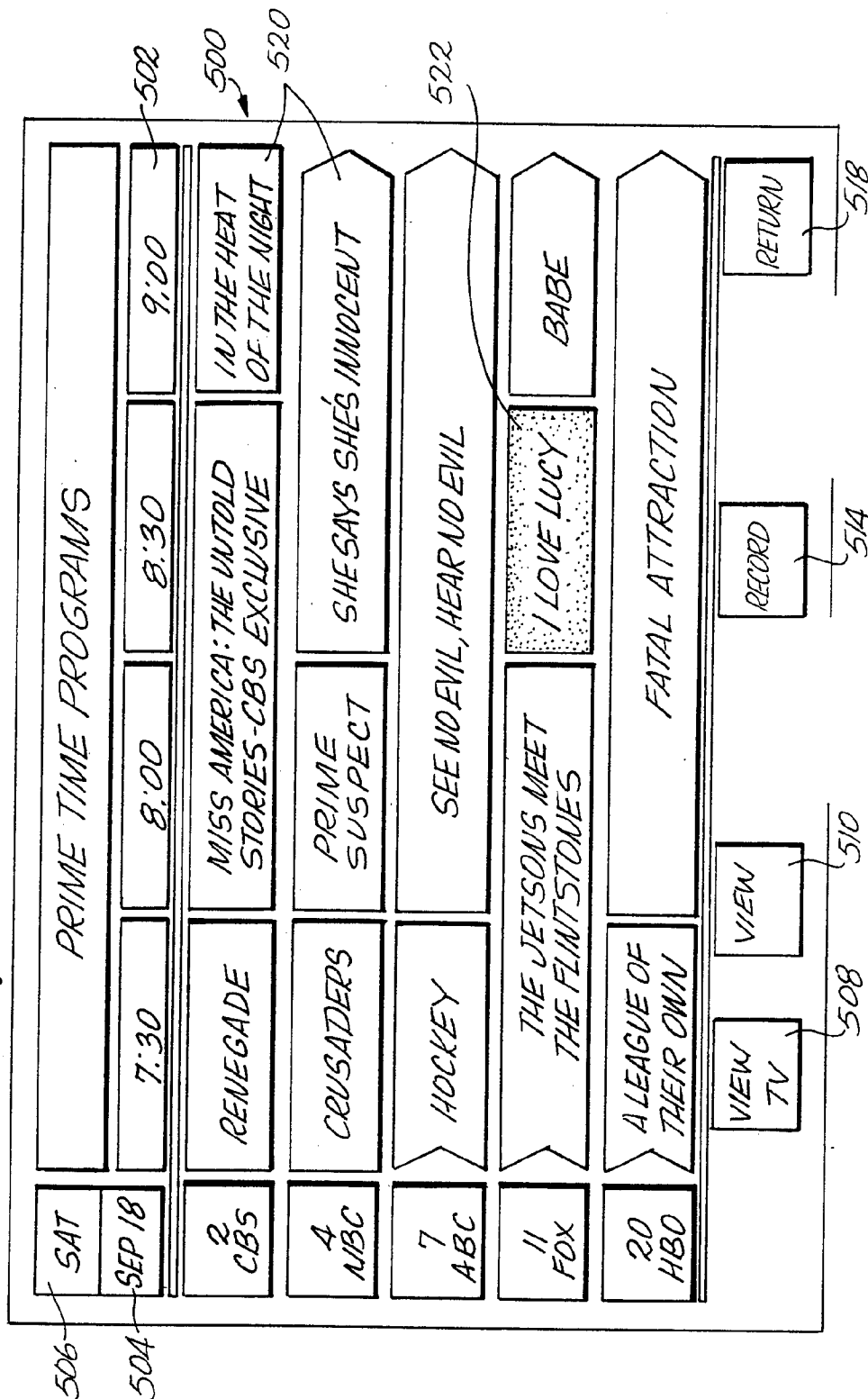


Fig. 17



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US94/12030

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :H04N 5/76

US CL :358/335

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 358/335, 310; 360/33.1, 69; 348/734; 455/185.1, 186.1, 186.2; H04N 5/76, 5/78, 5/782, 5/92, 9/79

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
NONE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	EP, A, 393955 (AKIGUCHI ET AL.) 24 October 1990, Fig. 1, Fig. 3, Fig. 4, and pages 2-5.	5-6 ----- 1-4, 7-42, and 45-79
X --- Y	US, A, 4,706,121 (YOUNG) 10 November 1987, Fig. 2, Fig. 3, columns 10-15, and column 21.	43-44 ----- 1-4, 7-11, 13- 29, 31-35, 45- 47, 49-57, 59- 72, and 74-79

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	
* "A" document defining the general state of the art which is not considered to be part of particular relevance	* "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
* "E" earlier document published on or after the international filing date	* "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
* "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	* "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
* "O" document referring to an oral disclosure, use, exhibition or other means	
* "P" document published prior to the international filing date but later than the priority date claimed	* "&" document member of the same patent family

Date of the actual completion of the international search
28 JANUARY 1995

Date of mailing of the international search report
17 FEB 1995

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US94/12030

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US, A, 4,908,713 (LEVINE) 13 March 1990, column 5.	36-39, 41-42, and 48-49
Y	US, A, 4,866,434 (KEENAN) 12 September 1989, column 5.	12, 30, 40, 58, and 73
Y	US, A, 4,873,584 (HASHIMOTO) 10 October 1989, Fig. 1 and columns 3-4.	1-79
A	US, A, 4,641,205 (BEYERS, JR.) 03 February 1987, Fig. 1a.	1-79